

# HOW PRIVATE EQUITY OUTPERFORMED PUBLIC EQUITY IN WESTERN MARKETS OVER THE LAST TWO DECADES

MASTER THESIS  
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## **Abstract**

The purpose of this study is to investigate the factors that contribute to private equity's superior performance compared to public equity in Western markets in recent years. Private equity is an increasingly popular investment vehicle, with many investors drawn to its potential for higher returns compared to public markets. However, there is little research on what causes the outperformance of private equity, and thus the explosive expansion of private equity funds. A regression model was used to examine the outperformance of private equity versus public markets. The model included independent variables such as industry sector, fund size, level of fund experience, investment strategies, macroeconomic conditions, and leverage. Data was collected from financial statements, industry reports, market indices, and secondary data sources. The results of the model were used to estimate the coefficients of the independent variables and to test their statistical significance. The findings of this study could provide valuable insights for investors, policymakers, and practitioners and could help inform decision-making about the allocation of capital and the financing of firms.

**Key words:** private equity, public equity, industry sector, fund size, level of fund experience, investment strategies, macroeconomic conditions, leverage.

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## 1. INTRODUCTION

### 1.1 Context of private equity and public equity in Western markets

The private equity industry has grown significantly in the last two decades, with private equity funds outperforming public markets in Western markets. According to a review by McKinsey & Company (2021), private equity currently manages \$4.5 trillion of which \$2.9 trillion of capital is allocated in western markets (EU & North America). Furthermore, its returns have exceeded those of public markets in the US and Europe over the past 20 years.<sup>1</sup> The review found that private equity funds returned an average of 14.3% per year, compared to 7.8% for the S&P 500 index considering the vintage years 2010-2020, while private equity funds have returned an average of 9.9% per year, compared to 6.4% for the S&P 500 index considering the vintage years 2000-2020.

Although private equity investments and returns took a rather large downturn around the mid 2000's (Brealey et al., 2014) and is growing at an unprecedented pace over the past 10 years (Harris et al., 2014), there is little to be found about what exactly causes this explosive expansion of private equity funds. As stated in Harris et al (2014), nailing down the sources of this large outperformance of private markets versus public markets would seem a fruitful subject for future research. Since private equity gained a lot of popularity by private- and institutional investors over the past decades<sup>1</sup>, and there exists ambiguity on what exactly causes this rather remarkable performance by private equity, this study will focus on what factors give drive to private equity's performance.

Private equity has become an increasingly popular investment vehicle in recent years, with many investors drawn to its potential for higher returns compared to public markets (Kaplan & Schoar, 2003). Understanding the factors that give drive to private equity's superior performance could help investors make more informed decisions about whether to allocate (a portion of) their portfolio to private equity. In addition, private equity has the potential to play a significant role in the financing of firms, particularly in the early stages of their development (Sahlman, 1990). By understanding the factors that contribute to private equity's performance, policymakers and regulators could better understand the implications of private equity for the overall economy.

Furthermore, private equity has the potential to create value through the improvement of the firms in which it invests (Phalippou & Gottschalg, 2008). By understanding the factors that commit to private equity's performance, researchers and practitioners could identify best practices for creating value through private equity investment. Moreover, Swensen (2000) suggests that having a strong exposure to private equity could lead to superior portfolio performance, which resulted in billions of dollars being invested in private equity assets by endowment funds, institutions, and high-net-worth individuals over the past two decades.

In contrast, some authors have questioned this view, pointing out that private equity returns may not be as high as those of public equity (Cumming, 2006), or that private equity may be associated with higher levels of risk, such as liquidity, bankruptcy, reinvestment, or partner/manager risks (Zhu et al., 2004), leading to the debate on whether private equity is a worthwhile investment.

The performance of private equity versus public equity funds can be difficult to assess due to the non-disclosure of the results within the industry. One study by Kaplan and Schoar (2005) found that private equity funds performed similarly to the S&P 500 after considering fees, implying that their performance was limited to market performance. However, more

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<sup>1</sup><https://www.mckinsey.com/~media/mckinsey/industries/private%20equity%20and%20principal%20investors/our%20insights/mckinseys%20private%20markets%20annual%20review/2021/mckinsey-global-private-markets-review-2021-v3.pdf>

recent research by Harris, Jenkinson, and Kaplan (2014) found that private equity funds outperformed the S&P 500 by over 20% during the operation of the fund, translating to a yearly average of over 3%. These conflicting findings highlight the challenge that both academics and market professionals face in evaluating the performance of private equity firms.

Academic literature on the performance of private equity vs. public equity reveals conflicting evidence. Some studies suggest that private equity outperforms public equity (Kaplan & Schoar, 2003; Ljungqvist and Richardson, 2003; Harris et al., 2014), while other studies show that public equity outperforms private equity, or that the performance of both is roughly equal (Phalippou & Gottschalg, 2008; Kaserer & Diller, 2004; Kaplan & Schoar, 2005). This discrepancy in findings highlights the need for a clearer understanding of the performance of these asset classes. Given the large amounts of capital that are invested in both private and public equity<sup>1</sup>, it is important to have a solid evidence base to inform investment decisions.

In conclusion, understanding the factors that commit to private equity's performance could provide insights into the potential risks and benefits of investing in private equity compared to public markets. For example, private equity may have higher returns but may also be associated with higher levels of risk (Zhu et al., 2004). By understanding these trade-offs, investors and policymakers could better understand the potential costs and benefits of investing in private equity. Therefore, the question central to this study concerns what factors gave drive to the (out)performance of private equity versus public equity.

## **1.2 Problem statement and research hypotheses**

Private equity has become an increasingly popular investment vehicle over the past few decades, with many investors drawn to its potential for higher returns compared to public equity. Private equity firms raise funds from endowment funds, institutional investors and high-net-worth individuals which are then used to purchase stakes in private companies or take public companies private. Despite the growing interest in private equity, there is limited understanding of the key factors that give drive to its superior performance compared to public equity in Western markets.

Consequently, this study aims to address this knowledge gap by investigating the impact of various factors on the outperformance of private equity in comparison to public equity. The study will focus on six variables in total: industry sector, fund size, level of fund experience, investment strategies, macroeconomic conditions, and leverage. The impact of these variables on private equity's performance will be examined through a regression model.

The rationale for focusing on these six drivers of private equity performance in western markets is due to the fact that, through a literature review on key factors influencing private equity performance outlined in 2.4 Factors affecting private equity and public equity performance, these six key drivers are expected to be of highly significant influence on private equity performance in western markets.

Therefore, the following hypotheses were formulated to empirically test whether the literature review on private equity performance in 2.4 Factors affecting private equity and public equity performance was done correctly. In addition, this research will examine whether the research used in the literature review failed to make any mistakes regarding their proposed drivers of private equity performance and whether these drivers are still applicable for our research time-horizon.

### 1.2.1 Research hypotheses

Based on the literature review in 2.4 Factors affecting private equity and public equity performance, the following hypotheses are formulated to test our proposed regressors.

#### *H 1.2.1.1 Industry sector*

Private equity investments in certain industry sectors outperform their public equity counterparts in Western markets.

#### *H 1.2.1.2 Fund size and level of fund experience*

Larger private equity funds and funds with higher levels of experience demonstrate a stronger relative performance compared to public equity investments.

#### *H 1.2.1.3 Investment strategies*

Private equity firms utilizing specific investment strategies such as VC (Venture Capital), GC (Growth Capital), and BO (Buyouts) experience superior performance compared to public equity investments.

#### *H 1.2.1.4 Macroeconomic conditions*

Private equity investments demonstrate varying levels of performance based on macroeconomic conditions, such as lower interest rates and higher GDP growth.

#### *H 1.2.1.5 Leverage*

The use of leverage positively impacts the performance of private equity compared to public equity in Western markets.

#### *H 1.2.1.6 Private equity outperformance*

Private equity returns have outperformed the S&P500 returns in western markets between 2000 up to and including 2020.

## **1.3 Aim of research**

The purpose of this study is to investigate the factors that commit to private equity's superior performance compared to public equity in Western markets over the last two decades. Private equity has become an increasingly popular investment vehicle, with many investors drawn to its potential for higher returns compared to public markets (Kaplan & Schoar, 2003). However, despite its growing popularity, there is a reasonable large discrepancy in the existing literature on what exactly causes the outperformance of private equity, and thus the explosive expansion of private equity funds.

To address this research gap, this study employs a regression model to examine the outperformance of private equity versus public markets in Western economies. The model includes a set of independent variables, such as industry sector, fund size, level of fund experience, investment strategies, macroeconomic conditions, and leverage, that may affect the performance of private equity investments. The results of the regression model will be used to estimate the coefficients of the independent variables and to test their statistical significance. The findings of this study could provide valuable insights for investors, policymakers, and practitioners and could help inform decision-making about the allocation of capital and the financing of firms.

The study aims to contribute to the literature on private equity by identifying the key factors that give drive to its outperformance, particularly in Western markets. The results of this research could have important implications for investors seeking higher returns, policymakers seeking to promote economic growth and job creation, and practitioners seeking to optimize investment strategies. The study is expected to provide a comprehensive analysis of the performance of private equity investments, which could improve our understanding of this important investment vehicle and its role in the global financial system.

#### **1.4 Theoretical contributions**

This study aims to contribute to the literature on private equity performance by examining the factors that drive private equity's performance relative to public markets. Private equity has outperformed public markets in the US and Europe over the past 20 years (McKinsey & Company, 2021). However, despite the impressive performance that private equity has realized, there remains a lack of consensus regarding the factors that drive its performance. While some studies have suggested that private equity outperforms public equity (Kaplan & Schoar, 2003; Ljungqvist and Richardson, 2003; Harris et al., 2014), others have shown that public equity outperforms private equity or that the performance of both is roughly equal (Phalippou & Gottschalg, 2008; Kaserer & Diller, 2004; Kaplan & Schoar, 2005). Therefore, there is a need for further research to better understand the drivers of private equity's performance.

This study will address this gap in the literature by identifying the key factors that drive private equity performance. By doing so, this study aims to make several theoretical contributions to the literature. First, by providing insights into the factors that drive private equity performance, this study will help investors make more informed decisions about whether to allocate a portion of their portfolio to private equity (Kaplan & Schoar, 2003). Furthermore, this study can contribute to the existing literature on value creation in firms and industries. Private equity's potential to create value through operational improvements in firms in which it invests has been widely discussed in the literature (Phalippou & Gottschalg, 2008).

#### **1.5 Practical contributions**

Firstly, the findings of this study can help investors make more informed decisions about whether to allocate their portfolio to private equity. As private equity has become an increasingly popular investment vehicle in recent years, many investors are drawn to its potential for higher returns compared to public markets. By understanding the factors that give drive to private equity's superior performance, investors can better evaluate the potential benefits and risks of investing in private equity.

Secondly, policymakers and regulators can benefit from a clearer understanding of the implications of private equity for the overall economy. Private equity has the potential to play a significant role in the financing of firms, particularly in the early stages of a firm's development. By understanding the factors that give drive to private equity's performance, policymakers and regulators can better understand the impact of private equity on economic growth, employment, and other macroeconomic factors.

Thirdly, the findings of this study can increase knowledge-spillover to practitioners in the private equity industry. Private equity has the potential to create value through the improvement of the firms in which it invests. By understanding the factors that contribute to private equity's performance, practitioners can identify best practices for creating value through private equity investment. This can include improvement of such practices as investment strategy, due diligence, or post-investment guidance.

Finally, this study can provide hard evidence to the ongoing debate on the performance of private equity versus public equity. Given the large amounts of capital that are invested in both private and public equity<sup>1</sup>, it is important to have a solid evidence base to inform investment decisions. By providing a clearer understanding of the performance of private equity, this research can provide insight for investors and policymakers to review the cost-effectiveness of investing in private equity compared to public markets.



## 1.6 Private equity explained

Private equity is risk capital which encompasses a diverse range of funding options, from supporting the inception of new businesses to acquiring established public companies, and various points in between (Gilligan and Wright, 2020). There are two sorts of investments which are often made by private equity companies, namely venture capital, and leveraged buyout (Phalippou & Gottschalg, 2008). Furthermore, private equity firms charge management fees for their investment activities. These fees range from 1% to 2.5% of the total committed funds and is often only charged when the performance of the fund is at or above a pre-specified hurdle rate (Brealey et al., 2014). These fees seem to distort the returns private equity firms produce but are so called “necessary evil” to account for the payment of private equity services and various transactions costs. In fact, these management fees are often solely obtained when the private equity firm produces better returns than pre-specified hurdle rates, which can cause the private equity firm to perform even better.

### 1.6.1 The private equity partnership

In private equity, partnerships are often formed between the private equity firm and its investors, who are also known as limited partners (LPs). These partnerships are usually structured as limited partnerships, with the private equity firm serving as the general partner (GP) and the investors serving as the limited partners (LP). The lifespan of private equity funds is usually 10 to 12 years (Kaplan & Schoar, 2005), dependent on the agreed terms, during which the general partner looks for investment opportunities in various industries, such as mature businesses with ample free cash flow that need restructuring. Once the agreement, or fund as you will, expires, the portfolio companies are sold, and the proceeds are distributed among the limited partners.

To put the fund returns of a private equity fund in perspective, a J-curve graph is added to visualize how returns are distributed throughout the fund’s lifespan. Notice that there is a discrepancy between cash-outflow and cash-inflow through the fund’s lifespan, and that the net cash position can be perceived as an equilibrium function of the funds cash in-and-outflow.

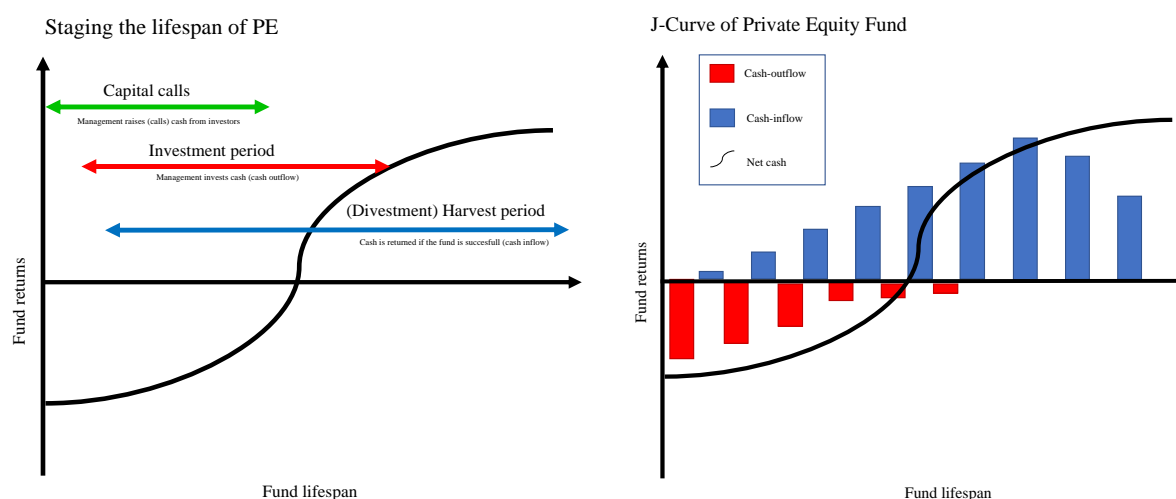


Figure 1: A fund's lifespan and return

First in line when considering the stages of the lifespan of a private equity fund are capital calls. Capital calls are used by private equity funds to demand (additional) capital from limited partners for new investments or to support existing portfolio companies. The general partner sends a notice to LPs outlining the amount and deadline for payment. Capital calls are typically made on a periodic basis. It's important to note that LPs are often legally bound to contribute the capital requested in a capital call. Failure to make a required capital contribution can result in penalties, forfeiture of the LP's interest in the fund, or other legal consequences.

Secondly, we will discuss the investment phase of a fund. The investment phase of the partnership involves the private equity firm using the capital from its investors to acquire ownership stakes in private companies. The private equity firm may use a variety of techniques, such as leveraged buyouts or growth capital investments, to create value in the companies it acquires. During the investment phase, the private equity firm takes an active role in the management of the companies it invests in, with the goal of improving their performance and increasing their value. Usually, GPs tend invest 1-5% of their own capital in the equity fund, whereas the LPs provide for the remaining 95-99% of the capital (Harris et al., 2014).

Thirdly, the divestment phase of a fund will be discussed, otherwise known as harvest phase. The divestment (harvest) phase of the partnership occurs when the private equity firm exits its investments and returns capital to its investors. This can happen in several ways, such as through an initial public offering (IPO), mergers or acquisitions, buyouts, or write-offs. When the private equity firm sells an investment, it realizes a gain or loss on its initial investment, and this gain or loss is shared between the private equity firm and its investors based on the terms of the partnership agreement.

Typically, the general partners of a private-equity fund get a management fee, usually 1% or 2% of capital committed plus a carried interest in 20% of any profits earned by the partnership (Kaplan & Schoar, 2005). In other words, the limited partners get paid off first, but then receive only 80% of any further returns. The general partners therefore have a call option on 20% of the partnership's total future payoff, with an exercise price set by the limited partners' investment (Brealey et al., 2014). To give an impression of how the organization of a private equity fund partnership is structured, Figure 2: Private equity fund partnership gives insight into how a private equity fund is arranged.

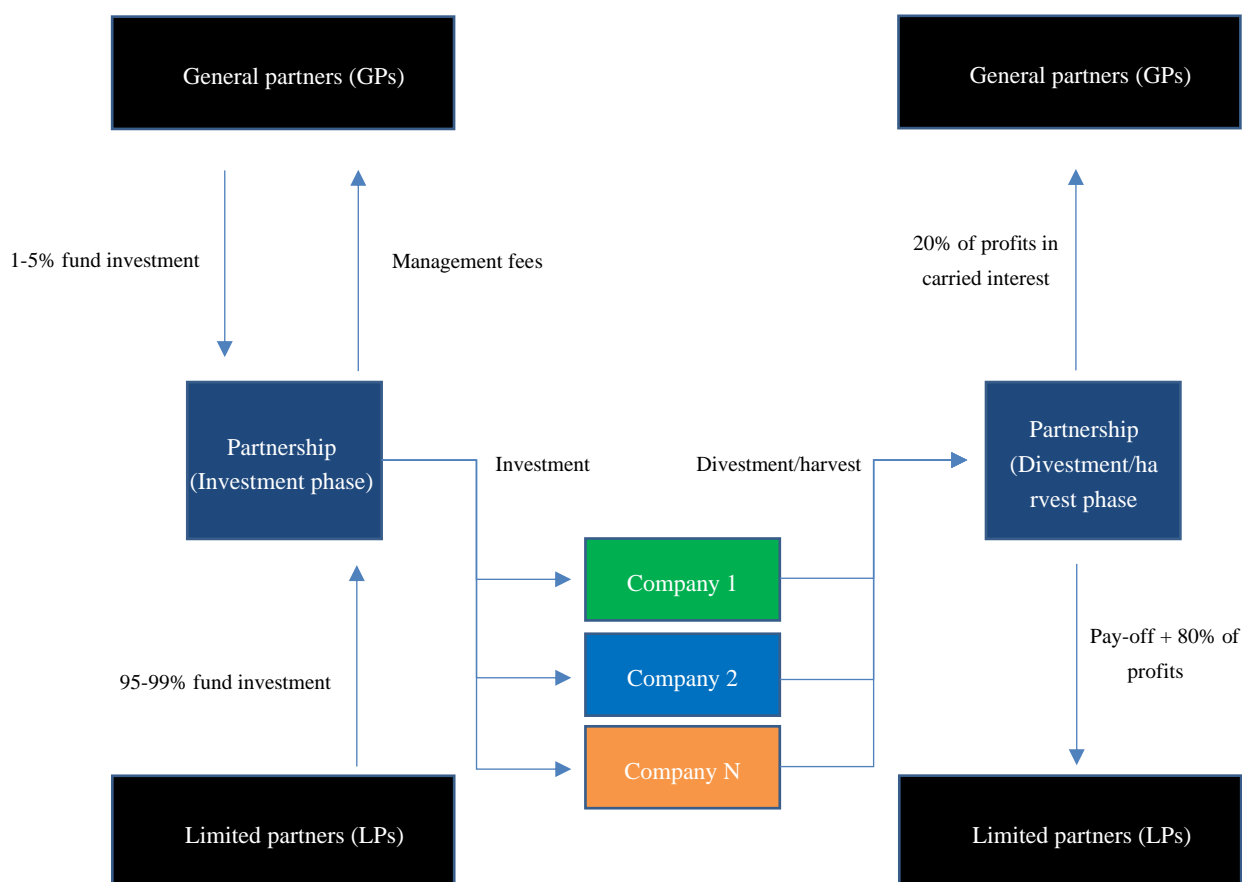


Figure 2: Private equity fund partnership

The exact terms of the partnership agreement can vary depending on the demands of the private equity firm and the investors involved. These terms may include the size of the fund, the investment strategy, the fee structure, and the terms of the divestment/harvest phase. It's important for investors to carefully consider these terms before entering a partnership with a private equity firm to ensure that their interests are aligned and that they understand the risks involved.

To gain further insight about how private equity firms invest their funds to provide for their returns, we will now discuss the three key types of private equity performance. Private equity is a type of investment that involves investing in privately held companies or acquiring public companies and turning them private. There are three main categories of private equity: venture capital (VC), growth capital (GC), and buyouts (Gilligan & Wright, 2020).<sup>2</sup>

Venture capital refers to investments made in early-stage companies with high growth potential. VC firms provide capital to these companies in exchange for an ownership stake, typically taking an active role in guiding their growth and development.

Growth capital, also known as expansion capital, is used to fund companies that are looking to expand their operations, products, or services. These companies have already established themselves in the market and are profitable but need additional capital to support their growth plans.

Buyouts involve the acquisition of a company, either by a private equity firm or a consortium of investors, with the goal of taking it private and restructuring it to increase its value. Buyouts are a type of private equity investment where investors acquire a controlling stake in an existing company. There are several types of buyouts: leveraged buyouts (LBO), management buyouts (MBO & MBI), institutional buyouts (IBO), and employee buyouts (EBO). In an LBO, investors use a significant amount of debt to finance the acquisition, with the aim of improving the company's financial performance to repay the debt. In an MBO, the existing management team acquires the company, while in an MBI, an external management team takes control. IBOs are similar to MBOs but involve a private equity firm acquiring a majority stake, often alongside the existing management team. EBOs involve the employees of the company pooling their resources to acquire the company.

### 1.6.2 Venture capital (VC) and growth capital (GC)

#### 1.6.2.1 Venture capital (VC)

First, private equity firms invest heavily in venture capital. Venture capital is a type of private equity investment that provides financing to early-stage and start-up companies with high growth potential (Harris et al., 2014). The goal of venture capital is to help young companies grow, and to achieve a substantial return on investment through a future initial public offering (IPO), the acquisition by a larger company, selling to a strategic buyer, or through a secondary buyout (Anson, 2004).

The private equity firm, who invests the venture capital, provides not only financial support but also strategic guidance and mentorship to help the start-up succeed. The investment process is usually done in stages, with each stage providing additional capital to support the growth of the business (Sahlman, 1990). These stages are, in sequential order: seed investments, startup, first stage (early development), second stage (expansion), third stage (profitable, but cash poor or little profit-margin), fourth stage (rapid growth), fifth/bridge stage (mezzanine investment), and the liquidity stage (cash-out or exit). The last stage is often the most important stage for the private equity firms since this stage will provide their return on their initial investment (Brealey et al., 2014). To further explain on the fifth/bridge stage, mezzanine investment refers to fund expansion plans. Mezzanine investments typically include subordinated debt, preferred equity, or a combination of both. This type of funding is often

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<sup>2</sup> Three key types of private equity: HBS Online. Business Insights Blog. (2021, July 13). <https://online.hbs.edu/blog/post/types-of-private-equity>

used to ‘bridge’ the gap between the amount of equity a company can raise and the amount of fund it needs to realize its growth plans.

#### *1.6.2.2 Growth capital (GC)*

Growth capital is investments made in the latter stages of development of young startup firms. Investments made in growth capital are usually targeted towards more established and matured companies that have demonstrated their profitability and have a stable cash flow. Often the growth of the profitability of the developing company has stagnated so the company requires a financial injection that ensures that the rate of profitability growth picks up pace again (Brealey et al., 2014).

### 1.6.3 Buyouts (LBO, MBO & MBI, IBO, and EBO)

A buyout refers to the acquisition of an existing, mature (distressed) company or through management take-overs. These acquisitions happen in public-to-private as well as private-to-public directions, depending on the specific circumstances of the transaction and the goals of parties involved in the acquisition. With specific regards to private equity, it is most common that underperforming or undervalued companies are selected for a specific buyout (Brealey et al., 2014). The most commonly used buyouts are considered to be LBO’s, MBO’s and MBI’s, followed by IBO’s and EBO’s.<sup>2</sup>

#### *1.6.3.1 LBO*

A leveraged buyout (LBO) is a financial strategy where a private equity firm acquires a company by using a significant amount of borrowed money or debt. The funds required for the purchase are typically obtained through investment banks, which help structure and arrange the debt financing. This approach enables the acquiring firm to leverage the assets and cash flow of the target company to finance the deal. The debt used in a leveraged buyout is usually backed by the assets of the acquired company and is repaid over time through its operating cash flow or by selling off its assets. An LBO is usually considered when general and/or limited fund partners do not want to commit a significant amount of its own capital, or when funds want to lower their total cost of capital (Cuny & Talmor, 2006). LBOs are usually confined to going-private transactions (Renneboog & Simons, 2005).

#### *1.6.3.2 MBO*

A management buyout (MBO) refers to the acquisition where the current management team of a company purchases the company from its current owners, often with the help of external financing, in this case private equity. The management team typically forms a new company or a special purpose vehicle (SPV) to acquire the target company. The SPV is usually financed through a combination of debt and (private) equity financing. Most public-to-private transactions are management-led, with the current management team taking over the firm, often with the support of private equity investors. In such cases, the leveraged buyout (LBO) is referred to as a Management Buyout (MBO) (Renneboog & Simons, 2005).

#### *1.6.3.3 MBI*

A management buy-in is a transaction where an external management team acquires a firm and takes it private is called a Management Buy in (MBI). Unlike MBOs, MBIs involve an outside management team with limited access to private information about the firm. Therefore, MBIs are a distinct type of transaction (Renneboog & Simons, 2005). External management teams often target firms where the incumbent management is unable or unwilling to realize the full potential of the company's value. Thus, MBIs are more likely to be hostile transactions.

#### *1.6.3.4 IBO*

Institutional Buyouts (IBOs), also known as Bought Deals or Finance Purchases, occur when institutional investors or private equity firms solely acquire a delisted firm. In some IBOs, the management team's role is crucial to the success of the transaction, and they are rewarded with equity stakes in the new private firm through equity ratchets. The key difference between

IBOs and Management Buyouts (MBOs) is how the management team gains equity ownership. In MBOs, the management team is part of the bidding group, while in IBOs, they receive equity as part of their compensation package.

#### 1.6.3.5 EBO

An Employee Buyout (EBO) is a form of buyout where the employees of a company purchase the business from its owners. In an EBO, the employees typically pool their resources and acquire the company through a combination of cash, stock, and debt. EBOs can be structured in different ways, but they often involve a trust or an employee stock ownership plan (ESOP) that holds the shares on behalf of the employees. In some cases, the employees may be able to negotiate a lower purchase price than an external buyer, since they have a better understanding of the company's operations and potential (Brealey et al. 2014).

### 1.6.3 Private equity investment selection process

The investment selection process in private equity aims to identify and evaluate potential investment opportunities in privately held companies for private equity to allocate its capital in to. Its goal is to carefully assess the risks and rewards associated with each opportunity, make informed investment decisions, and ultimately generate favorable returns for the private equity firm and its investors. This process is of utmost importance as it ensures that investments align with the firm's investment strategy, mitigates risks through thorough due diligence, and maximizes the potential for value creation and successful exits, thereby safeguarding the interests of the private equity partnership (Brealey et al., 2014).

The investment selection process holds five sequential phases in which a private equity firm (1)originates, (2)screens, (3)evaluates, (4)structures, and (5)monitors a deal. To illustrate how the investment selection process unfolds, a short overview of the investment selection process in shown. In addition, each phase of the investment selection process is briefly discussed using insights of Ljungberg and Svedman (2017) and Kaplan and Strömberg (2001).

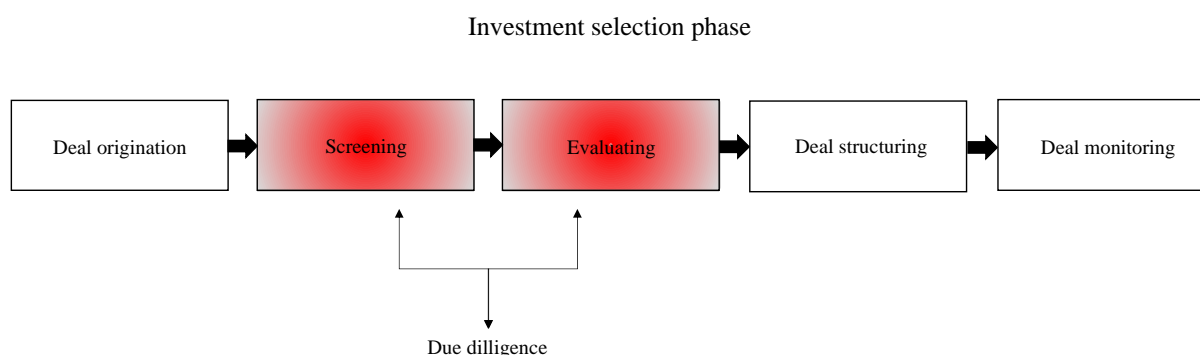


Figure 3: The investment selection process

#### 1.6.3.1 Deal origination

In this phase of the process, private equity firms actively source and identify potential investment opportunities. The private equity firm's advisors will leverage their personal network to establish potential deals, or the private equity firm establishes relationships with investment banks, industry contacts, and other sources to generate a distribution of potential deals. Origination involves extensive market research, networking, and proactive outreach to discover potential targets for investment.

1.6.3.2 *Screening (within due diligence)*

During the due diligence process, screening is the initial step where potential investment opportunities are evaluated based on specific criteria. This involves a preliminary review of key information such as financial statements, industry trends, growth potential, and strategic fit. It helps filter out opportunities that do not align with the private equity firm's investment strategy.

1.6.3.3 *Evaluation (within due diligence)*

The evaluation phase of due diligence is an in-depth analysis of the target company in which the private equity firm wants to invest in. It delves deeper into the company's financial records, operational performance, market position, competitive landscape and positioning, management team, legal contracts, and other relevant aspects. The purpose is to assess the risks, growth prospects, and value drivers of the investment opportunity.

1.6.3.4 *Deal structuring*

Once the evaluation is complete and the investment opportunity is deemed favorable, the private equity firm moves into the structuring phase. Here, the terms of the investment are negotiated, including the amount of capital to be invested, the ownership stake, the governance structure, and other key provisions. The goal is to structure a deal that aligns the interests of the private equity firm and the company's management team.

1.6.3.5 *Deal monitoring*

After the investment is made, the private equity firm enters the monitoring phase. In this phase, the private equity firm actively engages with the portfolio company, providing strategic guidance, operational support, and financial expertise to drive growth and enhance performance. Regular monitoring and reporting processes are established to track progress, assess risks, and make informed decisions to maximize the investment's value in order to meet their objectives.

1.6.4 The investment funnel

To emphasize how the investment selection process actually filters a larger potential deal pool into an increasingly smaller potential deal pool, a private equity investment funnel is illustrated showing exactly how this process is filtering deals.

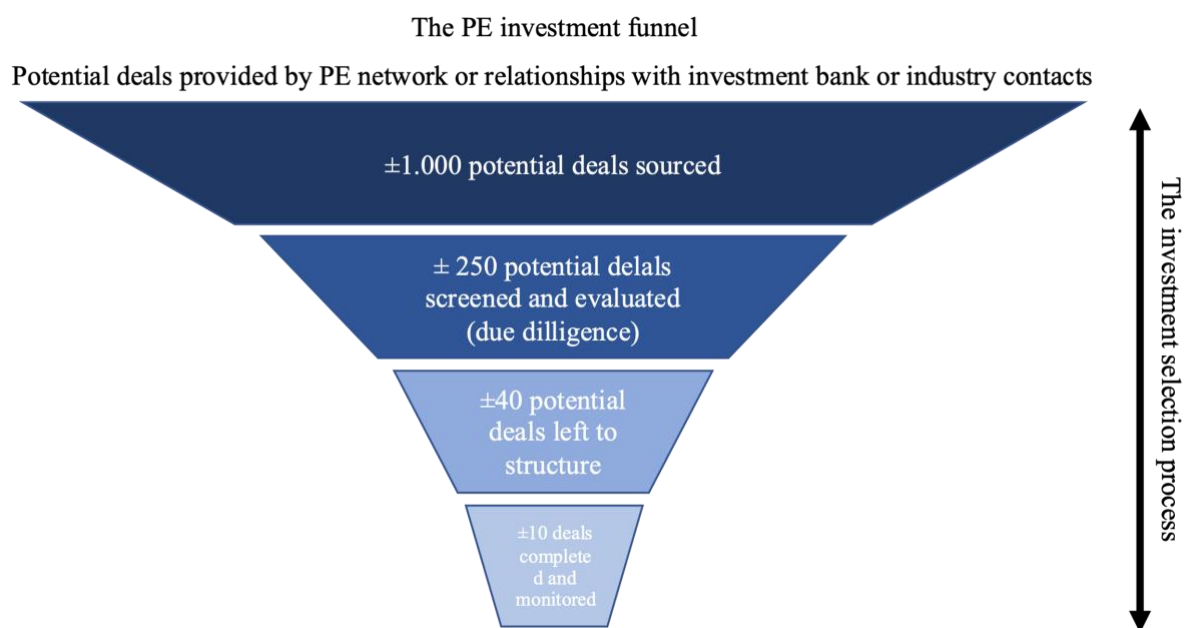


Figure 4: The private equity investment funnel

As shown in Figure 4: The private equity investment funnel, about 25% of the initial 1.000 potential sourced deals follows through to the due diligence phases in the selection process, leading to  $\pm 250$  potential deals to be screened and evaluated. Of the  $\pm 250$  possible investments, roughly 16% have reached the penultimate stage in which the GP's of private equity firms have to structure and close the deal to the best of the private equity partnership preferences. Lastly, only about 10 deals (investments) are closed, put into the private equity portfolio, and further monitored.

Some individuals may criticize the idea of a private equity firm that invest in a about twice a handful of companies and may raise the idea that a private equity firm, with all its expertise, simply has to put more effort in the investment selection process to filter more heavily resulting in only one or two investments per fund, but this criticism can be countered very swiftly. Since only 2 to 3 portfolio companies in a fund give private equity it's dominant returns, diversification and a portfolio approach for a private equity fund are key to success in terms of investing (Brealey et al., 2014).



## 2. LITERATURE REVIEW

### 2.1 Introduction

#### 2.1.2 Private and public equity

Private equity and public equity are two very popular investment vehicles that have been the subject of extensive research in recent years (Harris et al., 2014). Private equity refers to investments made in private companies that are not publicly traded on a stock exchange or taken off the stock exchange by private investors, while public equity investments are made in companies that are publicly traded. One of the key differences between private equity and public equity is the level of control that investors have over the company, with private equity investors typically having more control over their investments than public equity investors (Gilligan and Wright, 2020).

#### 2.1.3 Current state of literature and importance of this research

The performance of private equity and public equity investments has been a topic of significant interest to investors, policymakers, and academics alike. Private equity has been increasingly popular among investors due to its potential for higher returns compared to public markets (Kaplan & Schoar, 2003; Ljungqvist and Richardson, 2003; Harris et al., 2014), while other academics claim that private equity's performance is below or at par in comparison to public equity's performance (Phalippou & Gottschalg, 2008; Kaserer & Diller, 2004; Kaplan & Schoar, 2005). This study aims to clarify this discrepancy between various studies. Furthermore, there is a lack of consensus in the literature regarding the factors that contribute to private equity's performance. Considering these divergences, this research will tentatively determine which factors are of most importance on explaining private equity's performance in contrast to the performance of public equity.

#### 2.1.4 Following sections

This chapter provides an overview of the current state of research on private equity and public equity performance. We first introduce the theoretical frameworks that have been used to study private equity and public equity performance, as well as the strengths and weaknesses of each framework. We then review the empirical evidence on the performance of private equity and public equity investments, including any inconsistencies or gaps in the literature. Next, we will identify the key factors that have been found to affect the performance of private equity and public equity investments and analyze the existing literature on each factor. We will discuss critiques to private equity and their strengths and weaknesses. Finally, we provide recommendations for future research and preview how our study will address the gaps and inconsistencies in the literature.

### 2.2 Theoretical framework

#### 2.2.1 Theoretical framework overview

The academic literature on the performance of private equity versus public equity reveals conflicting evidence. Some studies suggest that private equity outperforms public equity, while others show that public equity outperforms private equity, or that the performance of both is roughly equal. Given this mixed evidence, it is important to examine the theoretical frameworks used in previous studies to better understand why these conflicting results may exist.

We will review several studies that have examined the performance of private equity versus public equity and evaluate the theoretical frameworks, if any, that these studies have used. If there is no specific theoretical framework used in the study, and the study is more exploratory in nature, we will focus more on the biases of collection and analyses of data.

The studies chosen for this review were selected based on their mixed outcomes and results regarding the performance of private equity in comparison to public equity performance. Those suggesting that private equity outperforms public equity include Kaplan and Schoar



(2003), Ljungqvist and Richardson (2003), and Harris et al. (2014). On the other hand, studies such as Phalippou & Gottschalg (2008), Cumming (2006), and Kaplan and Schoar (2005) show that public equity outperforms private equity or that the performance of both is roughly equal.

#### *2.2.1.1 Private equity outperformed public market*

*Kaplan and Schoar (2003)* examined how well private equity partnerships performed by analyzing individual fund returns. The findings suggest that, on average, these funds perform similarly to the S&P 500 stock index after accounting for fees. Venture funds (VC) (relatively) outperform the S&P 500 when weighted by committed capital, but buyout funds (LBO/MBO) do not. The study also indicates that both types of private equity partnerships (VC and Buyout) earn returns that exceed the S&P 500 before fees. However, the results may not be entirely reliable due to potential positive selection bias and understating market risk. Positive selection bias refers to the potential problem that, for the sample of private equity funds used in the study, selection was biased towards successful funds, which could overrate the performance of the private equity industry. Understating market risk means that the study may not fully account for the risks associated with investing in private equity. Private equity tends to hold more risk regarding illiquidity and operational risks. In turn, this could make private equity appear more attractive than it is.

*Ljungqvist and Richardson (2003)* analyze the performance of private equity funds using a unique framework of cash flow, return, and risk characteristics over the past two decades. The results show that private equity generates excess returns of 5-8% per year compared to public equity, which indicates that the results are not affected by different ways of measuring or assessing risk. The excess value generated on top of the private equity fund is estimated to be 23.8% relative to the present value of invested capital. This compensates the investors for holding a 10-year illiquid investment, which is in line with earlier mentioned lifespan of funds in this study.<sup>3</sup> The source of the outperformance is not necessarily compensation for systematic risk, but it may be related to the type of fund and the timing of the fund.

One of the strengths of the framework is the use of cash flow data to precisely estimate performance of private equity funds, which allows for a more accurate assessment of private equity performance compared to previous studies. However, the framework limits the results since it relies on subjective valuations by private equity fund managers. This implicates that there may be biases in the collected data, which could affect the accuracy of the conclusions drawn from the study. Nonetheless, the authors address this limitation by using multiple measurement methodologies and risk measures to ensure the validity of their results.

*Harris et al (2014)* investigated the performance of private equity partnerships using a dataset of individual fund returns. The results show that buyout funds have outperformed public markets by 25-27%, particularly the S&P 500, net of fees and carried interest. The conclusion that there has been outperformance is relatively insensitive to assumptions about benchmark indices and systematic risk. This means that the study's conclusion on private equity's outperformance of public equity is not affected by different assumptions made about benchmark indices (the measures used to compare the performance of different investments) or systematic risk/beta assumptions (market portfolio risk and sensitivity to its risk (beta)). In other words, even if different benchmarks or risk measures/sensitivities were used, the study's findings about private equity outperformance would still be evident. This implicates that the conclusion of private equity outperformance on public equity is reliable and solid. However, the study may suffer from a positive selection bias, similar to the study of Kaplan and Schoar (2003).

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<sup>3</sup> 1.6.1 The private equity partnership

### 2.2.1.2 Public market outperformed private equity

*Phalippou & Gottschalg (2008)* examined the performance of private equity funds and conclude that their net-of-fees performance is lower than that of the S&P 500 by 3% per year, while their gross-of-fees performance is higher than that of the S&P 500 by 3% per year. However, adjusting for risk, such as liquidity or bankruptcy risk, results in a decrease of approximately 3% per year, leading to a performance net of fees of -6% per year. The study also stresses the need to account for sample selection bias, which means that certain funds may be excluded from analysis due to poor performance, leading to a biased representation of the asset class. In addition, it cautions that the NAVs of old funds may not accurately reflect the face value of underlying assets, and therefore should be considered cautiously.

What is furthermore argued in the research is that performance should be evaluated with appropriately weighted profitability indices instead of average internal rates of return (IRRs), as internal rates of return (IRRs) may overstate a fund's performance due to the larger size or longer tenure of certain funds. This is because the larger funds may generate more significant cash flows later in the investment period, which can increase the IRR even if their performance is not better than smaller funds with shorter investment periods.

*Kaserer & Diller (2004)* examined the performance of European private equity funds based on realized cash flows, similar to Ljungqvist and Richardson (2003). The authors found that, using the public market equivalent (PME) approach, private equity funds generated an average PME of 0.96. To provide context, a PME of 0.96 means that private equity funds underperformed by PME 0.04, or in other words, returns of private equity funds were 4% inferior to those of public markets.

The authors used the MSCI Europe Equity Index and the JPMorgan Government Bond Index as benchmark indexes and found that private equity funds generated an overperformance with respect to the bond index and an underperformance with respect to the equity index.<sup>4</sup>

The study used the PME approach to estimate the return and risk characteristics of European private equity funds and their correlation structure to public markets. The authors also used the IRR-approach, which is inherent to some problems that the PME approach can resolve. The PME-approach provides a better way to compare private equity performance to public markets because it accounts for the timing and magnitude of cash flows, as well as the impact of fees and expenses. The PME-approach also ensures a more accurate estimation of risk-adjusted returns since it accounts for size and value of larger funds. However, the PME-approach assumes that cash flows generated by private equity funds are reinvested in a public market benchmark index, which may not always be the case.

*Kaplan and Schoar (2005)* study the performance of private equity partnerships using a data set of individual fund returns and cash flows, similar to Ljungqvist and Richardson (2003) and Kaserer & Diller (2004). The results indicate that average private equity fund returns net of fees are roughly equal to those of the S&P 500. However, weighted by committed capital, venture funds outperform the S&P 500 while buyout funds do not. When weighing for committed capital, each fund's performance is weighted in proportion to the principal that investors committed to the fund at the time of its establishment. The study also finds that returns persist strongly across funds raised by individual private equity partnerships, and that the performance of private equity funds increases with fund size and the GP's experience.

The theoretical framework underlying these results is based on the idea of underlying heterogeneity in the skills of General Partners (GPs) and concavity in the production function. Within the research, it is stated that successful GPs might choose not to grow their funds until the excess returns have been diluted if there are strong diseconomies from scale and scope.

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<sup>4</sup> The difference in performance when considering the two different benchmarks used in the study can be evident since bond's yield lower rates of return in comparison to equity investments, which may explain this difference in compared performances.

However, it remains puzzling why these returns to superior skills are not appropriated by the scarce input, the GP, in the form of higher fees. Although the study explains the persistence of returns across funds raised by individual private equity-partnerships as well as the positive relationship between fund size and performance, it lacks a clear explanation for why superior GP-skills do not result in higher fees.

### 2.2.2 Literature inconsistencies and gaps

First and foremost, we must admit that the main inconsistency in the literature above derives from the discrepancy within the existing literature whether private equity outperformed PM, or whether PM outperformed private equity. After reading the selected and reviewed articles above, we must conclude that there is a bias towards the construct that private equity has outperformed public markets. Kaplan and Schoar (2003) and Harris et al. (2014) found that private equity outperformed public markets, whereas Phalippou & Gottschalg (2008) and Kaserer & Diller (2004) found the opposite. Specifically, Kaplan and Schoar (2003) found that, on average, private equity funds perform similarly to the S&P 500 after accounting for fees, while Harris et al. (2014) found that buyout funds outperformed public markets by 25-27%. In contrast, Phalippou & Gottschalg (2008) found that private equity's net-of-fees performance is lower than that of the S&P 500, while Kaserer & Diller (2004) found that private equity funds generated an underperformance of 4% relative to public markets.

Next to performance discrepancy, we must conclude that there are also inconsistencies in the theoretical frameworks and methodologies used to evaluate private equity performance, such as the use of different benchmark indices, the use of cash flow formats, the adjustment for risk, and the use of profitability indices versus internal rates of return. Additionally, the studies may suffer from sample selection bias and data limitations. Moreover, when considering all the reviewed literature, we must admit that it is somewhat outdated since the most recent reviewed study stems from Harris et al. (2014). Therefore, this study will provide a more accurate, recent view on the question whether private equity outperformed PM, or vice versa.

## **2.3 Empirical evidence**

The empirical evidence on the performance of private equity and public equity in various contexts is somewhat mixed. Some studies find that private equity outperforms public equity, while others find the exact opposite. Moreover, Studies that find private equity outperforms public equity often use data from the 1980s and 1990s, while more recent studies have found little difference in performance between the two asset classes. This gives emphasis to the need to update the literature on the benchmarked performance of private equity versus public equity.

Furthermore, current empirical literature includes the use of large datasets and robust statistical methods but seem to be victimized to limited availability of data. Especially private equity, which often copes with disclosure and publication restrictions, limited data availability can easily lead to relatively small sample sizes and potential data biases, such as the ubiquitous selection bias mentioned in multiple studies which we have reviewed. Additionally, the heterogeneity of private equity investments can make it difficult to compare performance across funds. private equity investments, in terms of their investment strategies, target industries, geographies, fund size, stage of investment, and holding period, can vary heavily between funds, making it rather difficult and challenging to compare the performance of one private equity fund to another, as the funds may have very different portfolios, investment objectives, and risk profiles.

Most importantly, there are inconsistencies within empirical literature regarding the benchmarked performance of private equity in comparison to public markets. As mentioned earlier, some studies find that private equity outperforms public equity in certain industries, while others find the opposite. Comparing and contrasting the findings from different studies is difficult due to differences in methodology and data sources. Furthermore, some studies have

implied that private equity tends to outperform public equity in the short term, but the difference in performance diminishes over longer time horizons. Therefore, this study will aim to clarify these inconsistencies and update the current field of literature on this discrepancy.

## 2.4 Factors affecting private equity and public equity performance

### 2.4.1 Key drivers to private equity performance

Throughout the history of studying the performance of private equity, various factors have been examined on whether they would or would not drive private equity performance. When considering the reviewed literature fundamental to this study, seven key drivers to examine private equity performance arise.

*Industry sector*, several studies have found that the performance of private equity and public equity investments is influenced by the industry sector in which the firm operates. For example, a study by Phalippou and Gottschalg (2009) found that private equity funds investing in the industrial and healthcare sectors outperformed those investing in the financial and consumer sectors. Furthermore, Acharya et al. (2012) found that, on average, about 12% of the average deal IRR of private equity investments is due to exposure to the quoted sector itself.

In addition, following the latest Global Private Equity Report from Bain & Company, private equity firms that focus on specific industry sectors are surpassing traditional buyout funds.<sup>5</sup> The report highlights the advantages of specialization and expertise needed to thrive in private equity. The report indicates that the range of returns within a particular sector is much broader than the difference in returns between sectors. This means that while there are profitable and unprofitable deals in any industry, the best returns are generated by private equity funds with a clear understanding of their target sectors.

Although industry sector is not very widely examined for its effect on private equity performance, considering the literature, it has all the potential to be of significant effect on private equity's performance.

*Fund size*, fund size has been identified as a key factor affecting the performance of private equity investments. Kaplan and Schoar (2005) found that the relation between fund size and fund performance was significantly positive.

Phalippou (2010) further analyzed fund size and performance. Factors like fund size and sequence were found to be responsible for performance, but only for below-median performing funds. On the other hand, Aigner et al. (2008) documented that the size of the fund has a negative impact on private equity fund performance.

Ljungqvist and Richardson (2003) found that two important factors affecting performance are the flow of funds and the size of the fund itself. Larger funds may face more challenges in finding attractive investments and may also have difficulty in effectively managing portfolio companies. Additionally, larger funds may have higher management fees, which can eat into returns. Overall, the evidence suggests that fund size is a highly debated factor that should be considered when evaluating private equity investments.

*Level of fund experience*, the level of fund (GPs) experience has been found to be one of the key drivers to private equity performance. Braun, Jenkinson, and Stoff (2013) found evidence of performance persistence in pre-1998 portfolios, which they attributed to the experience of GPs. However, they could not find such persistence in post-1999 portfolios, suggesting that as the market matured, the performance of experienced GPs also dropped.

Similarly, Phalippou and Zollo (2006) found that the experience of GPs is positively associated with private equity fund performance. In addition, they tested if idiosyncratic risk drives performance and found no evidence in support of this hypothesis, except for lower performance of small and inexperienced funds.

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<sup>5</sup> GLOBAL PRIVATE EQUITY REPORT 2023, Bain & Company.

Aigner et al. (2008) also documented the positive impact of GP experience on private equity fund performance. Their study found that funds managed by experienced GPs tended to outperform those managed by less experienced GPs.

Taken together, these studies suggest that the level of fund experience can play a significant role in determining the performance of private equity investments. Experienced GPs may be better equipped to identify and execute successful investments, while less experienced GPs may struggle to achieve similar levels of performance.

Investment strategies, investment strategies have been found to play a crucial role in determining the performance of private equity investments. Phalippou and Gottschalg (2008) found that private equity funds that used buyout strategies outperformed those that used venture capital strategies. Ljungqvist and Richardson (2003) research confirms this finding, as buyout funds tend to outperform venture capital funds. In contrast, Harris et al. (2014) state that venture capital tends to outperform buyouts pre- 1999 (dot.com bubble), and that VC and BO performance is about equal post-1999. The research documented that the average beta of venture capital in relation to the market portfolio (S&P) was about 2.7 in contrast to a beta of 1.3 of buyout capital pre-1999, which is rather extraordinary considering higher amounts of leverage used in buyouts. Post-1999, VC's beta converges to 1, with a measured beta of 1.5 in contrast to 1.4 for buyout capital.

In addition, Aigner et al. (2008) claim that the returns of private equity funds engage in a positive relation with number of deals in a private equity fund, which is enhanced by relatively cheap, more frequent venture capital deals in new, young ventures in contrast to more expensive investments in mature companies, identifiable as buyouts. Thus, the higher number of deals made, the higher the yielded private equity returns.

Macroeconomic conditions, private equity performance can be affected by macroeconomic conditions such as interest rates, inflation, and economic growth (GDP growth). For example, Aigner et al. (2008) found that private equity funds performance is negatively correlated with rising interest rates. Additionally, Kaplan and Schoar (2005) found that private equity funds outperformed public equity indices during periods of low interest rates. Moreover, Phalippou and Zollo (2006) found that private equity returns are procyclical. They documented a strong relationship between the GDP's growth rate and private equity returns and an inverse relationship between level of interest rates and performance of private equity.

From a private equity valuation point of view, considering interest rates is highly conceivable since they contribute to or serve as discount rates for cash flows of private equity funds and as driver for expected market premiums by LPs. The higher the interest rates, the higher discount rates will be, thus the lower private equity will be evaluated (Brealey et al., 2014). Furthermore, higher interest rates will lead to a conservative funding climate where rising costs of capital are ubiquitous. This, in turn, will lead to a decreased GDP growth and an economic cool-down, which causes deteriorating private equity performance.

Leverage, private equity investments, especially buyouts, often involve a high degree of leverage, which can amplify returns but also increase risk. Current literature on the use of leverage in private equity varies across multiple contradicting results. For example, leverage can increase the potential returns for investors by allowing them to control a larger asset with relatively less equity investment (Kaplan and Stein, 1993). This can lead to higher valuations and potentially higher returns since relatively greater returns can be made with smaller equity stakes, or in other words private, non-borrowed capital. Additionally, the tax deductibility of interest payments can also boost returns.

However, on the other hand, excessive use of leverage can lead to problems such as financial distress and default, particularly during market downturns (Kaplan and Stein, 1993). Incentive problems can also arise when parties involved in the transaction cash out at the time

of the transaction, potentially leaving the acquired company with an unsustainable debt burden (Kaplan and Stein, 1993). Furthermore, funds raised during periods of high capital inflows, which are typically associated with market peaks, have been shown to perform far worse than their peers (Kaplan and Schoar, 2005).

## 2.5 Critiques to private equity

### 2.5.1 *Private equity criticism*

During the first private equity wave in the 1980s, higher leverage in private equity deals was criticized for potentially having adverse systemic implications. However, the traditional private equity fund structure is designed to limit systemic risk by offering long-term, illiquid, and unleveraged investment assets to investors with large, diversified portfolios (Gilligan and Wright, 2020). While the private equity industry did increase demand for debt during the second private equity wave, the market failures as seen in 2007-2008 were not caused by failures within the private equity fund structures, but rather through failures in the acquisition finance banking market. It is important to note that increasing pressure to provide liquidity to investors and to increase leverage within funds may lead to the creation of geared private equity funds, which could lead to an increased systematic (market) risk exposure.

Furthermore, private equity investments entail significant and unique risks that investors should be aware of, including a long investment horizon, rigid liquidity constraints, and high bankruptcy rates among portfolio companies (Zhu et al., 2004). While the potential for superior performance in private equity is evident, investors could face considerable difficulty in realizing returns due to these risks, in addition to standard security market risks. Therefore, private equity investments are far riskier than public equity investments, and investors should carefully consider these risks before investing.

Additionally, there are concerns among critics regarding the value creation by private equity and suggestions that profits of funds may not be a result of creating value. Instead, they may be driven by the favorable tax treatment of corporate debt, which persuades senior executives of publicly traded firms to accept deals that go against the interests of shareholders or break contracts with workers (Lerner et al., 2008). The favorable tax treatment of corporate debt means that the interest paid on corporate debt is tax-deductible, reducing the amount of taxes a company pays. This makes borrowing more attractive than issuing equity, as the cost of borrowing is lower due to the tax benefits. Private equity funds take advantage of this by using debt to finance their acquisitions, resulting in high levels of leverage and thus higher levels of systematic risks and risk of financial distress.

Critics also question whether private equity-backed firms truly focus on adding value and taking a longer-term perspective compared to public equity markets (Kosman, 2009). This is due to practices such as special dividends and "quick flips," which involve initial public offerings (IPOs) of firms soon after a private equity investment. These practices enable private equity groups to extract fees and raise new funds on very short notice but raise concerns about their true commitment to adding long-term value to their portfolio companies.

Critics of private equity have also raised concerns about the industry's profit expectations, which may be excessively high and unsustainable over the long term.<sup>6</sup> Additionally, private equity firms often have a relatively short investment horizon, which may not be suitable for industries that require longer-term planning and investment. This financial focus of private equity may also lead to a lack of attention to the technical and organizational needs of portfolio companies. Furthermore, the pressure to deliver high profits may result in private equity firms pushing portfolio companies towards overly risky strategies.<sup>6</sup>

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<sup>6</sup> PSE-Group in European Parliament (2007). Hedge Funds and Private Equity – A Critical Analysis. Report of the PSE-Group in the European Parliament.

### 2.5.2 Criticism inconsistencies and gaps

To address the inconsistency within the current literature on the economic functionality and performance of private equity, it will be debated below using literature that argues the exact opposite.

Private equity investments have the potential to create significant value for investors, portfolio companies, and the broader economy (Phalippou & Gottschalg, 2008). Private equity firms enhance productivity; marginal value-added productivity of labor is significantly higher than in comparable non-private-equity-backed firms (Gilligan and Wright, 2020). Private equity firms also bring significant expertise and resources to portfolio companies, which can help them overcome challenges and grow their portfolio businesses.

Moreover, private equity investments are not inherently riskier than public equity investments. While private equity investments do involve idiosyncratic risks, such as a long investment horizon, higher leverage ratios, and illiquidity constraints, these risks can be managed through proper due diligence, diversification, and risk management strategies (Brealey et al., 2014). In fact, due to higher levels of idiosyncratic risks, private equity investments often provide investors with higher returns than public equity investments (Moskowitz and Vissing-Jorgensen, 2002)

Private equity firms are not solely focused on extracting fees and short-term profits at the expense of long-term value creation. Private equity firms are incentivized to create sustainable value for their portfolio companies, as this will lead to higher returns for their investors over the long term (Phalippou & Gottschalg, 2008). In addition, private equity firms also have a fiduciary responsibility to act in the best interests of their investors and portfolio companies.

Private equity firms often invest in companies that need external funding or struggling financially, and they can provide the resources and expertise needed to turn these companies around and make them more competitive. Private equity investments can provide significant benefits to companies since it promotes the process of creative destruction, makes businesses more efficient, and increases total factor productivity (Davis et al., 2014). The financial focus of private equity firms is not inherently detrimental to portfolio companies. In fact, the focus on profitability and financial performance can often lead to improved efficiency, cost savings, and increased competitiveness for portfolio companies (Davis et al., 2014). Private equity firms also have a strong incentive to invest in the technical and organizational needs of portfolio companies, as this can help them achieve their financial goals over the long term.

## **2.6 Conclusion**

### 2.6.1 private equity performance literature summarization

Private equity and public equity are two popular investment vehicles that have been extensively researched (Harris et al., 2014). One key difference is the level of control investors have over the company, with private equity investors typically having a substantial amount of control over their portfolio companies (Gilligan and Wright, 2020). Some studies suggest that private equity outperforms public equity in terms of returns (Kaplan & Schoar, 2003; Ljungqvist and Richardson, 2003; Harris et al., 2014). However, other studies claim that private equity's performance is below or equal to that of public equity (Phalippou & Gottschalg, 2008; Kaserer & Diller, 2004; Kaplan & Schoar, 2005). Moreover, there is a lack of consensus in the literature regarding the factors that contribute to private equity's superior performance.

In terms of theoretical frameworks, previous studies have used various approaches to examine the performance of private equity versus public equity. Kaplan and Schoar (2003) found that private equity funds perform similarly to the S&P 500 after accounting for fees. Ljungqvist and Richardson (2003) found that private equity generates excess returns compared to public equity. Harris et al. (2014) found that buyout funds have outperformed public markets.

On the other hand, Phalippou & Gottschalg (2008) and Kaserer & Diller (2004) found that private equity underperforms public markets or performs roughly equal.

In addition, there are inconsistencies and gaps in the literature. The reviewed studies have different outcomes regarding the performance of private equity versus public equity, with a slight tendency towards private equity outperforming public markets. Inconsistencies arise from the use of different theoretical frameworks, methodologies, benchmark indices, and adjustments for risk. Sample selection bias and data limitations also affected the reliability of the studies. Additionally, the literature is somewhat outdated, with the most recent reviewed study being from 2014 (Harris et al.).

The empirical evidence on the performance of private equity and public equity is mixed, with some studies finding that private equity outperforms public equity while others find the opposite. Limited data availability, disclosure restrictions, and the heterogeneity of private equity investments pose challenges in comparing performance. Inconsistencies exist within empirical literature regarding the benchmarked performance of private equity versus public markets, and the difference in performance may diminish over longer time horizons.

The factors affecting private equity and public equity performance are not yet clearly established. The literature suggests the need for further research to clarify the discrepancies and update the field of literature on this topic (Harris et al., 2014).

The private equity industry has faced criticism for potentially increasing their exposure to systemic risk through higher leverage in deals. However, traditional private equity fund structures are designed to limit the exposure to systemic risk. Private equity investments come with significant and idiosyncratic risks such as long investment horizons, liquidity constraints, and bankruptcy risks, reinvestment risks, and agent risks. There are concerns that private equity firms may not add value to their portfolio companies and instead focus on short-term gains, resulting in high profits and quick-flips that may be detrimental for their long-term strategy. The industry's profit expectations may be excessively high, leading to a lack of attention to the technical and organizational needs of portfolio companies, and pushing them towards overly risky strategies. Critics also question whether private equity-backed firms truly focus on adding value and taking a longer-term perspective compared to public equity markets. Although discrepancies towards these critiques on private equity performance are highly debated within current literature, this research will provide for a better overall knowledgebase regarding private equity performance and the key drivers to this performance.

### 2.6.2 Functionality of research

The research aims to investigate how different factors impact the relative performance of private equity versus public equity investments in Western markets. By exploring the impact of industry sector, fund size and level of fund experience, investment strategies, macroeconomic conditions, and leverage, the study seeks to identify the key drivers of private equity performance and their interdependencies. The research questions mentioned in 1.2.1 help address the gaps and inconsistencies in the literature by providing a more comprehensive understanding of the factors that contribute to the performance of private equity benchmarked against the public market. This, in turn, will inform investors and policymakers in terms of capital allocation and firm financing decisions and will provide for a clearer vision and knowledgebase within the literature of private equity.



### 3. METHODOLOGY

#### 3.1 Research design and approach

##### *3.1.1 Design and approach overview*

The research design of this study employs a quantitative approach and relies on secondary data sources to investigate the factors influencing private equity performance versus public market performance. This design allows for a systematic and rigorous analysis of the selected independent variables which are expected to give drive to private equity performance, namely industry sector, fund size, level of fund experience, investment strategies, macroeconomic conditions, and leverage.

Moreover, secondary data sources will be utilized for this study, which involves gathering existing data from previously published research articles, industry reports, financial databases, and other relevant sources. These include databases such as Preqin, Thomson Reuters, and public financial statements of private equity funds. Data will be collected for both private equity and public equity investments to enable a comparative analysis. These sources provide for a comprehensive pool of data, allowing for a wide-ranging analysis across different time periods, geographical regions, and industry sectors.

The research design involves collecting and compiling data on private equity performance metric, the net internal rate of return (NET IRR) from the selected secondary sources. Additionally, data related to the independent variables, including industry sector classifications, fund size, fund experience, investment strategies, macroeconomic indicators, and leverage ratios will be collected to further research whether these key drivers indeed impact private equity performance (measured by NET IRR and Sharpe ratio) on significant scale.

Furthermore, once all necessary data is collected to test our anticipated relationship between the independent variables and private equity performance, a variety of statistical techniques, such as descriptive statistics, correlation analysis, and regression analysis will be employed to analyze the collected data and explore the relationships between the independent variables and private equity performance. The regression analysis will provide several outputs for interpretation and analysis. The coefficient estimates will indicate the direction and strength of the relationships between the independent variables and private equity performance. Statistical tests, such as t-tests or p-values, will determine the significance of these relationships.

The regression analysis, and thus the data set, is based on several key assumptions that need to be considered when interpreting the results. In this study, we have carefully assessed these assumptions to ensure the validity of our findings. Firstly, the assumption of linearity is met as we have modeled the relationship between the independent variables and the dependent variable as a linear function. Secondly, the assumption of independence is satisfied as our dataset consists of independent observations without any autocorrelation or dependence among the residuals. Thirdly, we have confirmed the assumption of homoscedasticity by examining the variance of the residuals, which is found to be constant across all levels of the independent variables. This indicates that there are no systematic patterns or trends in the residuals.

Regarding multicollinearity, we have thoroughly examined the independent variables and found no evidence of high correlation or linear dependence among them. Each independent variable contributes unique information to the regression model, supporting the assumption of no multicollinearity. Lastly, we have ensured that our dataset does not exhibit endogeneity, meaning there is no relationship between the error term and the independent variables.

Additionally, a diagnostic test will be conducted to assess the assumptions of regression absence of multicollinearity among independent variables. This test ensures the validity and reliability of the regression model and its findings.

The results of the regression analysis will contribute to addressing the hypotheses related to the factors influencing private equity performance. The analysis will provide quantitative evidence on the significance and magnitude of the effects of the independent variables, allowing for a more nuanced understanding of the drivers of private equity performance in Western markets.

### **3.2 Data sources and variables**

For conducting a thorough analysis on the key drivers to private equity performance versus public market (S&P500) performance over the past two decades (2000-2010, 2010-2020) in Western markets, a variety of data sources has been used to gather all necessary data needed for the analysis. To provide for a complete and comprehensive overview of the research design, we will thoroughly explain all data sources used for each variable used in our research as well as the meaning of and metric(s) used for each variable.

The data set used in this study consists of worldwide private equity and venture capital (VC) fund performance, retrieved from Preqin, a leading data provider in the industry. The dataset was obtained from Preqin's comprehensive database, which aggregates information from a wide range of sources, including fund managers, investors, and regulatory filings. This dataset encompasses a diverse set of private equity and VC funds, representing various industry sectors, fund sizes, investment strategies, and geographic regions. Although the dataset contains data on various private equity and VC funds on global scale, our focus will lie on private equity funds located in north America and the EU.

The dataset provided by Preqin offers information on 79 usable private equity funds, including their characteristics, performance metrics, and industry focus. In this study, the dataset was accessed without imposing specific minimum selection criteria for the funds, allowing for a comprehensive representation of the private equity landscape. The dataset initially included information on a total of 11,234 funds on a global scale. However, due to the study's specific focus on the time period from 2000 to 2020 and the regions of the United States (US) and European Union (EU), as well as potential data limitations, such as missing data, the final sample size was reduced to 79 funds.

#### **3.2.1 Private equity performance**

The evaluation of private equity performance requires a comprehensive and nuanced approach that goes beyond simplistic measures such as absolute returns or comparisons to public market indices. In this section, we outline the methodology used to measure private equity performance, considering the six key drivers that are believed to significantly impact its outcomes. As mentioned before, private equity's sole performance will be measured by considering the NET IRR and Sharpe ratio.

##### ***3.2.1.1 Internal rate of return (NET IRR)***

In this study, we adopt the widely used metric of Internal Rate of Return (NET IRR) as the primary measure to assess private equity performance. The NET IRR has been extensively utilized in academic research and by industry professionals due to its ability to capture the key aspects of private equity investments.

Internal rate of return (NET IRR) represents the annualized rate of return that an investment generates over its holding period, considering both cash inflows and outflows. It provides a comprehensive measure of the profitability and efficiency of the investment,

incorporating the timing and magnitude of cash flows. By considering the time value of money and presenting returns on an annual basis, NET IRR enables meaningful comparisons between different investments and asset classes. What distinguishes the NET IRR of the IRR is the subtraction of fees charged by the private equity fund, thus, NET IRR represents the net returns for limited partners (LPs) in private equity partnerships.

#### *3.2.1.2 Sharpe ratio*

The Sharpe ratio is a measure of risk-adjusted return in finance. It quantifies the excess return earned by an investment per unit of risk taken, typically represented by the standard deviation of returns. A higher Sharpe ratio indicates a better risk-return trade-off, as it reflects a higher return relative to the amount of risk involved. It helps investors assess and compare investment performance, considering both returns and risk.

Together, the NET IRR and Sharpe ratio provide a comprehensive evaluation of private equity performance, capturing both the annualized rate of return and the risk-adjusted return. By incorporating these measures, we ensure a holistic assessment that accounts for both the profitability and efficiency of the investment. It is worth noting that while the NET IRR and Sharpe ratio are widely accepted as robust measures of private equity performance, they do have limitations. For instance, they do not account for the timing and magnitude of cash flows beyond the investment horizon, potentially understating the long-term performance. Additionally, they may not capture non-monetary benefits, such as strategic value or industry knowledge gained through the investment.

Given the practicality and widespread acceptance of the NET IRR and Sharpe ratio in the field, they represent the best available options for measuring private equity performance in a standardized and comparable manner. Therefore, for the purposes of this study, we employ NET IRR and Sharpe ratio as the primary performance metrics to provide insights into the performance of private equity investments.

#### *3.2.2 Public market performance*

In this study, the performance of the public market was measured by tracking the S&P 500 index, including dividends, on an annually basis from 2000 to 2020. The S&P 500 was chosen as the benchmark for several reasons. First, it is widely recognized as a representative index of the U.S. equity market (i.e., market portfolio), consisting of 500 large-cap companies across various sectors. This broad representation makes it a suitable reference point for evaluating the overall performance of the public market. Additionally, the S&P 500 has a long history and is widely tracked by investors, making its data readily available and reliable.

By including dividends in the S&P 500 performance measurement, we aimed to capture the total return experienced by investors, which aligns with the nature of private equity returns that include both capital appreciation and distributions. This approach allows for a more meaningful comparison between private equity performance and the public market, considering the income generated from dividends and providing a more comprehensive view of investment returns. The data for the S&P 500, including dividends, was sourced from the official website of the index, ensuring accuracy and consistency in the analysis.

#### *3.2.3 Key drivers of private equity performance*

##### *3.2.3.1 Industry sector*

The industry sector per private equity fund was measured by examining the main industry focus of the selected private equity funds in the dataset. Each fund's primary area of investment was identified to capture the specific industry exposure of the funds under analysis. This approach allows for a detailed analysis of how industry sector allocation may influence the performance of private equity investments. By considering the industry focus of each fund, we

can gain insights into the performance variations across different sectors and assess the impact of industry-specific factors on private equity returns. The industry sector per fund data was obtained from reliable sources, such as fund disclosures, prospectuses, or publicly available information, ensuring accuracy and consistency in the classification of funds into their respective industry sectors. The industry sector variable was recoded in SPSS to group specific industry names or descriptions into numerical codes, enabling analysis of the impact of industry sectors on private equity fund performance.

#### *3.2.3.2 Fund size*

The fund size of each private equity fund was measured in USD million. Fund size is a crucial variable in understanding the scale and capacity of private equity investments. By quantifying the fund size in USD million, we can assess the magnitude of capital available for investment and evaluate the potential impact on fund performance. The fund size data was obtained from the Preqin database. It is important to accurately measure the fund size to ensure consistency and comparability across different funds. By incorporating the fund size as a variable, we can examine how the scale of investment activities may influence the performance outcomes of private equity funds.

#### *3.2.3.3 Level of fund experience*

The level of fund experience was measured using the Assets Under Management (AUM) of the fund manager, and through the sequential fund number provided within the dataset to all funds. AUM is a widely recognized metric that indicates the size and scope of a fund manager's operations. By considering the AUM, we can infer the level of experience and expertise accumulated by the fund manager over time. A higher AUM suggests a greater track record and experience in managing investments. Furthermore, a higher sequential fund number indicates that the private equity firm previously managed one or multiple funds, indicating a higher level of fund management per latter number of funds. The AUM and sequential fund number data was collected from the Preqin database. By incorporating the level of fund experience as a variable, we aim to examine how the knowledge, skills, and resources of fund managers may impact the performance of private equity funds.

#### *3.2.3.4 Investment strategies*

To measure the investment strategy of the private equity funds in this study, we utilized data from the Preqin database. We extracted information on the investment focus, such as venture capital, growth capital, and buyouts, as well as any specific sector preferences or geographic preferences indicated by the funds. By leveraging the data available in the Preqin database, we obtained a comprehensive overview of the investment strategies employed by the private equity funds under analysis. This allows us to examine the relationship between investment strategy and performance outcomes, providing valuable insights into the drivers of private equity success. The investment strategies variable was recoded to transform various descriptions or labels representing different investment approaches into numerical codes, allowing for an examination of the relationship between investment strategies and NET IRR (%).

#### *3.2.3.5 Macroeconomic conditions*

In this study, macroeconomic conditions will be measured by examining interest rates and GDP growth in both the United States and the European Union (EU). Interest rates play a crucial role in shaping investment decisions and the cost of capital, influencing the performance of private equity investments. By monitoring changes in interest rates, particularly those set by central banks, we can gain insights into the monetary policy environment and its potential impact on investment activity and economic growth.

Additionally, GDP growth serves as an essential indicator of overall economic performance. By analyzing the GDP growth rates of the US and EU, we can assess the health and expansion of their respective economies. GDP growth reflects the aggregate output of goods and services, providing an understanding of the broader economic conditions that may

influence private equity investments. All the data for measuring macroeconomic conditions was retrieved via the Federal Reserve Economic Data platform (Federal Reserve Economic Data: Fred: St. louis fed).

#### *3.2.3.6 Leverage*

Leverage was measured using the Debt-to-Equity (D/E) ratio, which was listed in the Preqin database. The D/E ratio is a financial metric that compares the amount of debt financing to the equity capital in a private equity fund. It provides an indication of the fund's leverage level and the proportion of debt relative to equity in its capital structure. A higher D/E ratio suggests a greater reliance on debt financing, which can amplify returns but also increase the fund's financial risk. By utilizing the D/E ratio data from the Preqin database, this study was able to assess the extent to which leverage was employed by different private equity funds across various sectors, fund sizes, and investment strategies. The D/E ratio serves as a valuable measure for understanding the financial structure and risk profile of private equity funds, providing insights into their capital allocation decisions and potential impact on fund performance.

## 4. RESULTS

### 4.1 Descriptive statistics

#### 4.1.2 Private equity VS the S&P 500 index

Variable	N	Minimum	Maximum	Mean	Std. Deviation
NET IRR (%)	79	-31.95%	68.5%	9.95%	18.22%
S&P500 RETURNS	21	-36.5%	32.2%	8.12%	17.63%

Table 1: Descriptive statistics

##### 4.1.2.1 NET IRR (%)

NET IRR (%) represents the Net Internal Rate of Return, which measures the annualized rate of return on an investment after considering cash inflows and outflows. The minimum NET IRR (%) is -31.95%, indicating the lowest rate of return observed in the dataset. The maximum NET IRR (%) is 68.50%, representing the highest rate of return observed. The mean NET IRR (%) is 9.95%, providing an average NETT IRR value for the dataset. The standard deviation of 18.22% measures the dispersion or variability of the NET IRR (%) values around the mean.

##### 4.1.2.2 S&P500 RETURNS

S&P500 RETURNS represents the returns of the S&P 500 index. The minimum S&P500 RETURNS is -36.5%, indicating the lowest return observed in the dataset. The maximum S&P500 RETURNS is 32.2%, representing the highest return observed. The mean S&P500 RETURNS is 8.12%, providing an average S&P500 return for the dataset. The standard deviation of 17.63% measures the dispersion or variability of the S&P500 RETURNS values around the mean.

These findings reveal that overall, private equity fund performance in our dataset exhibited a higher average annualized return compared to the S&P 500 index. The NET IRR demonstrated a mean value of 9.95%, indicating that, on average, private equity funds yielded an annualized return of approximately 9.95%. In contrast, the S&P 500 index displayed a mean total return of 8.15%, considering both price appreciation and dividends, and thus comparable to the NET IRR. Furthermore, on average, private equity firms yielded a return of 25% (1/4) on capital invested into private equity.

### 4.1.3 Key drivers of private equity performance

Variable	N	Minimum	Maximum	Mean	Std. Deviation
FUND SIZE (USD MN)	79	19,100	1.800	321,78	357,41
FUND MANAGER TOTAL AUM (USD MN)	79	60	715.000	16.148,29	81.913,03
FUND NUMBER (OVERALL)	79	1	34	6.27	5.72
GDP YOY GROWTH % (EU)	21	-5.7%	3.9%	1.31%	2.31%
GDP YOY GROWTH % (US)	21	-2.8%	4.1%	1.85%	1.77%
GDP YOY GROWTH % (AVERAGED)	21	-4.2%	4.0%	1.58%	1.98%
INTEREST RATE YOY % (ECB)(EU)	21	0.2%	5.4%	3.12%	1.61%
INTEREST RATE YOY % (FED)(US)	21	0.1%	6.2%	1.71%	1.89%
INTEREST RATE YOY % (AVERAGED)	21	0.3%	5.8%	2.42%	1.50%

Table 2: Descriptive statistics regressors

#### 4.1.3.1 FUND SIZE (USD MN)

The "FUND SIZE (USD MN)" variable represents the size of funds in millions of U.S. dollars. The dataset includes 79 observations, with fund sizes ranging from 19,10 to 1.800 million dollars. The average fund size is 321,78 million dollars, with a standard deviation of 357,41. This variable provides insights into the range and distribution of fund sizes within the dataset.

#### 4.1.3.2 FUND MANAGER TOTAL AUM (USD MN)

The "FUND MANAGER TOTAL AUM (USD MN)" variable captures the total assets under management (AUM) for fund managers. The dataset contains 79 observations, with AUM values ranging from 60.000 to 715.000 million dollars. The mean AUM is 16148.29 million dollars, with a standard deviation of 81913.03. This variable provides information on the total value of assets managed by fund managers in the dataset.

#### 4.1.3.2 FUND NUMBER (OVERALL)

The "FUND NUMBER (OVERALL)" variable indicates the sequential number of funds a private equity firm has ever executed in the dataset. It includes 79 observations, with fund numbers ranging from 1 to 34. The average fund number is 6.27, with a standard deviation of 5.72. This variable gives insights into the level of experience of managing funds and provides an understanding of the number of funds included in the analysis.

#### 4.1.3.3 GDP YOY GROWTH % (EU)

The "GDP YOY GROWTH % (EU)" represents the year-on-year percentage growth of the Gross Domestic Product (GDP) in the European Union (EU). The dataset includes 21 observations, with growth rates ranging from -5.7% to 3.9%. The mean GDP YOY growth rate for the EU is 1.31%, with a standard deviation of 2.31%. This variable provides information on the economic performance and growth trends within the EU.

#### 4.1.3.4 GDP YOY GROWTH % (US)

The "GDP YOY GROWTH % (US)" represents the year-on-year percentage growth of the Gross Domestic Product (GDP) in the United States. The dataset contains 21 observations, with growth rates ranging from -2.8% to 4.1%. The mean GDP YOY growth rate for the US is 1.85%, with a standard deviation of 1.77%. This variable provides insights into the economic growth trends in the United States.

#### 4.1.3.5 GDP YOY GROWTH % (AVERAGED)

The "GDP YOY GROWTH % (AVERAGED)" variable represents the averaged EU and US year-on-year percentage growth of the Gross Domestic Product (GDP). The dataset includes 21 observations, with growth rates ranging from -4.2% to 4.0%. The mean averaged

GDP YOY growth rate is 1.58%, with a standard deviation of 1.98%. This variable provides an overall measure of economic growth trends in western markets based on the averaged GDP growth rates.

#### *4.1.3.6 INTEREST RATE YOY % (ECB)(EU)*

The "INTEREST RATE YOY % (ECB)(EU)" represents the year-on-year interest rates set by the European Central Bank (ECB) within the European Union (EU). The dataset contains 21 observations, with interest rate changes ranging from 0.2% to 5.4%. The mean interest rate YOY in the EU is 3.12%, with a standard deviation of 1.61%. This variable provides insights into the fluctuations and trends in interest rates set by the ECB within the EU.

#### *4.1.3.7 INTEREST RATE YOY % (FED)(US)*

The "INTEREST RATE YOY % (FED)(US)" represents the year-on-year interest rates set by the Federal Reserve (FED) in the United States. The dataset contains 21 observations, with interest rate changes ranging from 0.1% to 6.2%. The mean interest rate YOY in the US is 1.71%, with a standard deviation of 1.89%. This variable provides insights into the changes and trends in interest rates set by the FED in the US.

#### *4.1.3.8 INTEREST RATE YOY % (AVERAGED)*

The "INTEREST RATE YOY % (AVERAGED)" variable represents the averaged EU and US year-on-year interest rates. The dataset includes 21 observations, with interest rates ranging from 0.3% to 5.8%. The mean averaged interest rate YOY is 2.42%, with a standard deviation of 1.50%. This variable provides an overall measure of the averaged year-on-year interest rates in western markets, incorporating both the ECB (EU) and the FED (US) interest rate data.

## **4.2 Private equity vs public markets**

### ***4.2.1 IRR spread and Sharpe ratio***

In this study, a total of 79 private equity funds were analyzed, covering the time-horizon period from 2000 up to and including 2020. In Addition, annual percentage S&P500 returns were measured from 2000 up to and including 2020. The private equity funds' performance relative to the performance of the S&P500 was measured using the net internal rate of return (IRR) spread calculated through the Long-Nickels PME (LN-PME) methodology and through the Sharpe ratio.

#### *The LN-PME and the net internal rate of return spread (IRR spread)*

The LN-PME, also known as the Public Market Equivalent (PME), was introduced by Austin M. Long and Craig J. Nickels in 1996. The LN-PME compares the performance of a private equity fund with the S&P 500 Index by simulating a theoretical investment in the index using the private equity fund's cash flows. The methodology assumes that capital calls are used to "buy the index" and distributions are used to sell the equivalent amount of the index. LN-PME IRR is very beneficial since it is directly comparable to the private equity Fund IRR, allowing an apples-to-apples comparison.

We must admit that LN-PME has a potential shortcoming. In the PME analysis, the performance of a private equity fund is compared to the performance of a hypothetical investment in a public market index, typically the S&P 500. The cash flows of the private equity fund, including contributions and distributions, are assumed to be invested in the index at the corresponding dates. When distributions are made by the fund, an equivalent amount is assumed to be sold from the index investment. However, if a private equity fund makes frequent and large distributions, or the fictive public fund holds short positions for extended



time periods, it can lead to a situation where the remaining value of the index investment becomes negative, known as the shortness problem.<sup>7</sup>

This occurs when the sum of the distributions exceeds the total value of the index investment, or when in more complex cash flow situations, the fictive fund may even engage in short positions that eventually recover to a positive end net-asset-value (NAV). However, when the fictive vehicle holds short positions for an extended period, the validity of the LN-PME calculation becomes questionable because it involves finding the discount rate at which the sum of the cash flows equals zero. Since the remaining value of the index investment is negative, it disrupts the calculation process.

In such cases, it is highly probable that the measured outperformance according to LN-PME would be significantly lower than the actual outperformance. As a result, exceptional funds may appear mediocre in terms of their performance. Thus, The LN-PME method has a mathematical issue that arises for successful funds or during challenging market conditions. Unfortunately, this problem is often only recognized as an academic concern.<sup>7</sup> Approximately 30% of private equity funds are affected to certain degrees, with 5% of cases where the LN-PME calculation is incomputable. This can lead to a significant underestimation of true outperformance, making exceptional funds appear mediocre when evaluated using LN-PME.

As a result, when using LN-PME benchmarking, multiple studies have measured a higher mean for similar public market benchmark values concerning performance, such as PME+.<sup>7</sup> Interestingly, under LN-PME benchmarking, the performance of the private equity sample appears on par with the public market. However, when employing PME+ benchmarking, where the shortness problem is partly accounted for, the private equity sample demonstrates an outperformance of nearly 3% compared to the public market.

In this research, there is a well sense of awareness concerning the shortness problem. Therefore, we must keep in mind that the results from the IRR spread may very well be blind sighted to the shortness problem, thus implying that private equity funds' performance would probably be more significant if we got hold of a more precise PME benchmark.

By comparing the value of the fund's investment to the theoretical value of the index investment, the LN-PME provides insights into how an equivalent investment in the public market would have performed. The IRR spread, which represents the difference between the actual IRR of the fund and the LN-PME, indicates the fund's outperformance or underperformance relative to the index.

Before subtracting the LN-PME from the NET IRR, and thus computing the NET IRR spread, we will first compare the means of the NET IRR and LN-PME via a paired samples t-test since it allows us to examine whether there is a significant difference between the two measurements. This comparison helps to assess whether one metric (NET IRR or LN-PME) tends to be consistently higher or lower than the other, providing insights into the performance of the private equity funds vs the S&P500.

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<sup>7</sup> <https://docs.preqin.com/reports/Preqin-Special-Report-PME-July-2015.pdf>

Pair	Variable	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	NET IRR (%)	9.95052	79	18.215061	2.049354
	S&P 500 LN-PME	8.57504	79	6.8004087	0.765106

Pair	Variable 1	Variable 2	N	Correlation	Sig.
Pair 1	NET IRR (%)	S&P 500 LN-PME	79	-0.039	0.730

Pair	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval (Lower)	95% Confidence Interval (Upper)	t	df	Sig. (2-tailed)
Pair 1	1.375479	19.692413	2.215556	-3.035538	5.786340	0.621	78	0.537

Table 3: The paired samples t-test

The paired samples t-test of the data revealed the following results for the comparison between the net internal rate of return (Net IRR) of the private equity funds and the S&P 500 public market equivalent (LN-PME).

The Net IRR (%) of the 79 funds exhibited a mean of 9.95% (SD = 18.22), while the S&P 500 LN-PME had a mean of 8.58% (SD = 6.80). This indicates that private equity funds' returns have relatively higher variability than the returns of the S&P500 based on LN-PME.

There was a weak negative correlation (-0.039) observed between the Net IRR and S&P 500 LN-PME across the 79 funds. However, this correlation was not statistically significant (p = 0.730). This suggests that there is no strong linear relationship between the performance of the funds (Net IRR) and the performance of the S&P 500 compared to LN-PME.

The mean difference between the Net IRR and S&P 500 LN-PME (IRR SPREAD) was 1.38, with a standard deviation of 19.69. The 95% confidence interval for the difference ranged from -3.04 to 5.78. The t-value (0.621) indicated that the difference was not statistically significant (p = 0.537). Thus, we must reject hypothesis H 1.2.1.6 Private equity outperformance.

Although non-significant, the mean difference indicates that private equity funds in western markets between 2000 up to and including 2020 have outperformed the S&P500 (public market portfolio) by 1.38%. This is in line with the previous findings in analysis 4.1.2 Private equity VS the S&P 500 index.

Moreover, it seems like the S&P500 underperformed relatively to private equity in western markets during 2000 up to and including 2020 based on earlier computed means (4.1.2 Private equity VS the S&P 500 index) and the paired samples t-test mean (yet non-significant), the difference between these two S&P500 means in both analysis is likely to be caused by the limitations (the shortness problem) of the LN-PME as discussed in The LN-PME and the net internal rate of return spread (IRR spread).

*Sharpe ratio*

The Sharpe ratio is a widely used measure of risk-adjusted return that takes into account both the return and volatility of an investment. It provides a way to compare the excess return generated by an investment (in this case the private equity fund) relative to a risk-free rate of return (typically a treasury bond) per unit of volatility. In this research, we will use the averaged interest rates of both the EU and US since it covers our geographical focus (western markets) more precise.

To calculate the Sharpe ratio for each private equity fund, the annual returns (NET IRR) of the Private equity funds were compared to the risk-free rate, such as the yield on a treasury bond. The excess return (fund return minus risk-free rate) was divided by the fund's standard deviation to measure the risk-adjusted return. A higher Sharpe ratio indicates a better risk-adjusted performance, as it implies a higher return per unit of risk. The exact formula for computing the Sharpe ratio concludes the following equation:

$$\frac{(R_p - R_f)}{\sigma}$$

$R_p$  = Return on portfolio

$R_f$  = Return 10-year treasury (risk-free rate)

$\sigma$  = Standard deviation portfolio

In terms of the focus of the research, the portfolio translates to the 79 private equity funds measured via the NET IRR (%) representing private equity performance, and LN-PME representing S&P500 performance. Since there was no specific data on cash distributions made by the 79 private equity funds, it was impossible to statistically test the Sharpe ratio on significance. Thus, the average Sharpe ratio of the 79 funds was computed to ensure a comprehensive assessment.

The choice of using the Internal Rate of Return (IRR) as the measure for evaluating the Sharpe ratio of private equity investments in comparison to the S&P 500 LN-PME is driven by its alignment with the concept of total returns.

The IRR captures the timing and magnitude of cash flows in private equity investments, providing a comprehensive evaluation of their performance. While the Sharpe ratio traditionally incorporates risk-free rates, the use of IRR allows for a meaningful comparison between private equity and the S&P 500, both of which are characterized by their exposure to market risks. By considering the total returns, including dividends, of the S&P 500, the choice of IRR enables a robust analysis of risk-adjusted performance, revealing the relative attractiveness of private equity investments compared to market portfolio benchmark, the S&P500.

This approach provides valuable insights into the risk and return characteristics of private equity investments in comparison to those of the market portfolio and enhances our understanding of their performance in the context of the broader financial market.

The Sharpe ratio analysis conducted in this study is based on the time horizon spanning from 2000 to 2020. To ensure a comprehensive assessment, we incorporated the paired average risk-free rates from both the European Central Bank (ECB) and the Federal Reserve (Fed).<sup>8</sup> By considering the 10-year treasuries from both regions, we obtained a representative measure of the risk-free rates within the scope of western markets for the entire time horizon.

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<sup>8</sup> <https://fred.stlouisfed.org/>

In calculating the mean Internal Rate of Return (IRR), we have utilized data from a sample of 79 funds, as the IRR serves as a fundamental metric for evaluating the performance of these funds. In addition, for a more nuanced and accurate comparison against the S&P 500, we have chosen to use the LN PME (Public Market Equivalent) as a measure of S&P 500 performance. The LN PME takes into account the cash flows and valuations of the private equity funds, providing a more precise benchmark for performance comparison.

By incorporating the LN PME as the metric for the S&P 500, we can capture the specific characteristics and complexities of both the Private equity funds and the market index. This approach allows for a more meaningful and insightful comparison of risk-adjusted returns between the two asset classes. The LN PME provides a comprehensive picture of the market's performance, including dividends and price changes, and aligns with the unique nature of private equity investments.

	N	Mean	Std. Deviation
<b>NET IRR (%)</b>	79	9.9505	18.2151
<b>S&amp;P 500 LN-PME</b>	79	8.5750	6.8004
<b>INTEREST RATE YOY % (AVERAGED)</b>	21	2.418%	1.4950%
<b>Valid N (listwise)</b>	21		

Table 4: Sharpe ratio formula variables

Using this data, we will now compute the Sharpe ratios for the 79 private equity firms using the net IRR (%) and the LN-PME, the latter metric representing the S&P500 as benchmark.

$$\begin{aligned}
 - \text{ Private equity: } & \frac{(R_p - R_f)}{\sigma} = \frac{(9.9505 - 2.418)}{18.2151} = \frac{7.5325}{18.2151} = 0,414 \\
 - \text{ S\&P500: } & \frac{(R_p - R_f)}{\sigma} = \frac{(8.5750 - 2.418)}{6.8004} = \frac{6,1570}{6.8004} = 0,905
 \end{aligned}$$

The calculated Sharpe ratios indicate important insights into the risk-adjusted performance of the 79 measured private equity funds and the S&P 500. The Sharpe ratio for the private equity funds, based on the net IRR, is 0.414, while the Sharpe ratio for the S&P 500, based on the LN-PME, is 0.905.

The higher Sharpe ratio for the S&P 500 suggests that, on average, the broad market index has achieved a more favorable risk-adjusted return compared to the private equity funds in the sample. A Sharpe ratio above 0 indicates a positive risk premium earned relative to the risk-free rate, and a higher value implies a higher risk-adjusted return.

While the Sharpe ratio for the private equity funds is lower, it is important to consider the specific characteristics and risk-return profile of private equity investments. Private equity investments often involve longer time horizons, illiquidity, and unique cash flow dynamics. The lower Sharpe ratio may be attributed to the inherent risks associated with such investments. It is worth noting that private equity investments are typically pursued for their potential for higher absolute returns rather than solely focusing on risk-adjusted metrics.

Overall, the higher Sharpe ratio for the S&P 500 suggests that, during the observed period, the broad market index has provided relatively better risk-adjusted returns compared to

the private equity funds in the sample. However, it is crucial to interpret these results in the context of the specific investment objectives and characteristics of private equity investments.

To further examine the observed phenomenon of private equity outperforming the S&P 500 while exhibiting a higher risk-return ratio, we have employed several statistical metrics, including the median, skewness, kurtosis, and percentiles. By employing these metrics, we can gain a comprehensive understanding of the distributional characteristics and inherent risks associated with private equity and the S&P 500, contributing to a more robust analysis of their performance and risk-return profiles.

The median provides a measure of central tendency that is less influenced by extreme values, allowing us to gain insights into the typical performance of private equity and the S&P 500. Skewness helps us understand the asymmetry of the return distributions, indicating whether there is a propensity for extreme positive or negative returns. Kurtosis, on the other hand, sheds light on the tails of the distributions, informing us about the likelihood of extreme returns. Additionally, examining percentiles allows us to analyze specific points in the return distributions, such as the 25th and 75th percentiles, providing insights into the spread and variability of returns.

	<b>NET IRR (%)</b>	<b>S&amp;P 500 LN-PME</b>
<b>N (Valid)</b>	79	79
<b>N (Missing)</b>	0	0
<b>Median</b>	9.00000	10.10954
<b>Skewness</b>	0.875	-2.383
<b>Std. Error of Skewness</b>	0.271	0.271
<b>Kurtosis</b>	1.792	10.829
<b>Std. Error of Kurtosis</b>	0.535	0.535
<b>25th Percentile</b>	-0.54000	5.67543
<b>50th Percentile (Median)</b>	9.00000	10.10954
<b>75th Percentile</b>	15.30000	12.11956

*Table 5: Distributional characteristics*

Upon examining the data, several key findings emerge regarding the phenomenon we previously discussed. The dataset includes valid observations for 79 private equity funds' NET IRR (%) and S&P 500 LN-PME, with zero missing values.

The median NET IRR (%) for the private equity funds is 9.00, while the median S&P 500 LN-PME stands at 10.11. The skewness of the NET IRR (%) distribution is 0.875, indicating a slight positive skew, which means that private equity funds have more extreme positive values or less extreme negative values. The S&P 500 LN-PME distribution exhibits a significant negative skew with a value of -2.383, indicating more extreme negative returns, or less extreme positive returns. A thorough conclusion on whether private equity or S&P500 have more, or less extreme positive or negative returns will be made when examining the frequency histograms in the latter.

The kurtosis values further underscore the differences between the two distributions. The NET IRR (%) distribution has a kurtosis of 1.792, suggesting a moderately peaked shape, while the S&P 500 LN-PME distribution displays a higher kurtosis of 10.829, indicating a significantly more peaked and potentially heavy-tailed distribution.

A kurtosis value of 1.792 for the NET IRR (%) distribution indicates a moderately peaked shape. This suggests that the distribution has relatively fewer extreme values or outliers compared to a perfectly symmetrical distribution with a kurtosis of 3 (which represents the normal distribution). In other words, the returns of the private equity funds, as measured by NET IRR (%), are relatively less concentrated around the mean and have a more moderate spread. On the other hand, the S&P 500 LN-PME distribution exhibits a significantly higher kurtosis value of 10.829. This indicates a distribution with a more spiked peak and potentially heavy tails. A higher kurtosis value suggests that the returns of the S&P 500, as measured by LN-PME, have a higher concentration around the mean and a greater frequency of extreme values or outliers.

Examining the percentiles provides additional insights into the data. The 25th percentile for NET IRR (%) is -0.54000, indicating that approximately 25% of the private equity funds have a negative return. In contrast, the 25th percentile for S&P 500 LN-PME is 5.67543, implying that the bottom quartile of LN-PME values is higher than the median NET IRR (%).

To relate a little more to the findings stemming from the skewness on the variability of the returns from private equity, if we examine the higher value in the 75<sup>th</sup> percentile for the NET IRR (%) (15.3) in contrast to the relatively lower value of the LN-PME (12.12), and in contrast to the other percentiles where private equity (NET IRR %) has lower values than the S&P500 (LN-PME), we can cautiously state that private equity has more relatively higher positive values in contrast to the S&P500 (LN-PME).

In conclusion, the statistical measures, including the median, skewness, kurtosis, and percentiles, highlight the differences in the return distributions between private equity (NET IRR %) and the S&P 500 (LN-PME). These findings support our earlier observations that private equity outperforms the S&P 500 but exhibits higher variability and potentially more extreme returns, as indicated by the higher skewness and kurtosis values.

To further examine the distribution of returns from private equity and the market portfolio, we will incorporate frequency histograms along with the normal curve. Frequency histograms provide a visual representation of the distribution of returns, allowing us to observe the shape, concentration, and dispersion of the data. By overlaying the normal curve on the histogram, we can assess the extent to which the return distributions deviate from a normal distribution.

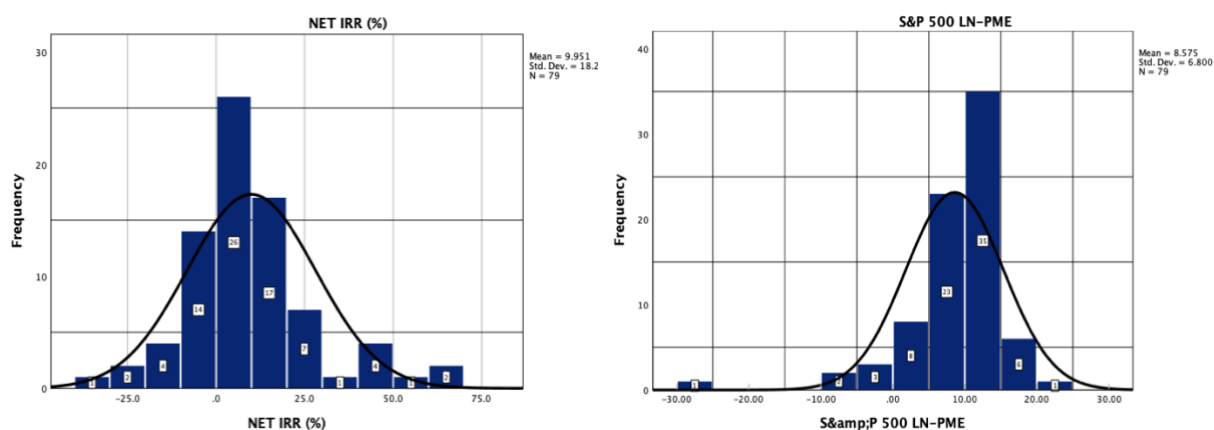


Figure 5: Frequency histograms

The frequency histograms of both the NET IRR (%) and the S&P500 LN-PME indicate that both investments are normally distributed, but that indeed the private equity funds have generated more variable returns relative to the S&P500 over the time horizon of 2000 up to and including 2020 in western markets. Furthermore, the private equity funds have yielded both more extreme positive and negative returns in contrast to the S&P500. This observation

is in line with all our previous analysis made on the relative performance of private equity funds benchmarked against the market portfolio.

### 4.3 Regression analysis

#### 4.3.1 Pearson correlation matrix

In this study, we aim to investigate the key drivers of private equity performance. To achieve this, we will conduct a regression analysis to examine the relationships between the suspected independent variables and private equity performance as the dependent variable. Before delving into regression, it is essential to perform a preliminary analysis to assess the relationships between the variables. Therefore, we will begin by conducting a Pearson correlation analysis. This initial step will allow us to explore the strength and direction of the linear relationships, identify potential patterns or trends, and assess the potential predictive power of the independent variables. Additionally, it will help us identify any multicollinearity issues among the independent variables, ensuring the reliability and validity of the subsequent regression analysis.

	NET IRR (%)	FUND SIZE (USD MN)	D/E RATIO	FUND NUMBER (OVERALL)	CORE INDUSTRIES	INTEREST RATE YOY % (AV)	GDP YOY GROWTH % (AV)	FUND MANAGER TOTAL AUM (USD MN)
NET IRR (%)	1	0.036	0.283*	-0.057	-0.145	0.173	0.206	0.005
FUND SIZE (USD MN)	0.036	1	0.155	-0.086	-0.097	0.714**	0.350	0.080
D/E RATIO	0.283*	0.155	1	-0.142	-0.046	0.208	0.101	-0.101
FUND NUMBER (OVERALL)	-0.057	-0.086	-0.142	1	0.043	-0.506*	0.067	0.072
CORE INDUSTRIES	-0.145	-0.097	-0.046	0.043	1	-0.386	-0.064	-0.105
INTEREST RATE YOY % (AV)	0.173	0.714**	0.208	-0.506*	-0.386	1	0.398	-0.107
GDP YOY GROWTH % (AV)	0.206	0.350	0.101	0.067	-0.064	0.398	1	-0.536*
FUND MANAGER TOTAL AUM (USD MN)	0.005	0.080	-0.101	0.072	-0.105	-0.107	-0.536*	1

Table 6: Pearson correlation matrix

The Pearson correlation matrix reveals several significant correlations among the variables. Firstly, there is a positive correlation of 0.283\* between the net IRR (%) and the D/E ratio. This suggests that higher levels of leverage, as indicated by the debt-to-equity ratio, may be associated with higher net IRR. In other words, funds with higher levels of debt relative to equity may yield higher returns.

Secondly, there is a significant positive correlation of 0.714\*\* between the averaged year-over-year interest rate and the fund size (USD MN). This indicates that larger funds tend to be correlated with higher interest rates. It implies that fund size may influence the interest rates offered or accessed by the private equity funds, potentially reflecting the higher borrowing costs associated with managing larger funds.

On the other hand, this significant positive correlation is a bit odd with regards to rising interest rates and its effects on the overall market since rising interest rates usually cause risk premiums to decline, resulting in a relatively less attractive investment.

Additionally, there is a noteworthy negative correlation of -0.536\* between the averaged year-over-year GDP growth rate and the fund manager's total assets under management (AUM). This suggests that larger AUM may be associated with lower GDP growth rates. It

could be an indication that fund managers handling larger AUM might adopt a more conservative investment approach, potentially focusing on stability and preservation of capital which is more suitable in times of slow economic growth. Moreover, it is thinkable when GDP rates are relatively high, (potential) investors are less keen to let their capital being managed in order to yield return to offset lower economic growth.

Furthermore, a significant negative correlation of  $-0.506^*$  is observed between the core industries of the funds and the overall fund number. This implies that as the fund number increases, there may be a tendency for a narrower focus on specific core industries. This suggests that as more funds are established, they may specialize in specific industries rather than maintaining a broader investment scope.

It is important to note that based on the Pearson correlation matrix, there is no immediate need for further analysis as multicollinearity does not appear to be a significant issue. Multicollinearity refers to high correlations between independent variables, which can complicate statistical analysis. However, the correlations presented here exhibit relatively low intercorrelation, indicating that each variable provides distinct and valuable information.



## 4.3.2 Regression analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.793a	.699	.480	5.192427

Model	Sum of Squares	df	Mean Square	F	Sig.
1	546.332	8	68.291	2.533	.047b
Residual	323.536	12	26.961		
Total	869.867	20			

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	Collinearity Statistics
1	Constant: -3.285	-.510 (Beta)	.619		
FUND SIZE (USD MN):	.006	.406	1.433	.049	Tolerance: .386, VIF: 2.590
FUND NUMBER (OVERALL):	1.507	.652	2.952	.012	Tolerance: .636, VIF: 1.573
D/E RATIO:	3.092	.219	1.020	.042	Tolerance: .672, VIF: 1.488
FUND MANAGER TOTAL AUM (USD MN):	-0.9720	-.023	-.090	.930	Tolerance: .473, VIF: 2.113
GDP YOY GROWTH % (AVERAGED):	-.395	-.118	-.465	.651	Tolerance: .476, VIF: 2.100
INTEREST RATE YOY % (AVERAGED):	.673	.152	.486	.636	Tolerance: .315, VIF: 3.174
STRATEGY:	-1.641	-.256	-1.071	.305	Tolerance: .541, VIF: 1.848
CORE INDUSTRIES:	.154	.052	.233	.819	Tolerance: .613, VIF: 1.631

Table 7: Regression analysis

The overall model shows a reasonably good fit, with an R-squared value of 0.699, indicating that approximately 69.9% of the variance in NET IRR (%) can be explained by the predictor variables. The adjusted R-squared value of 0.480 suggests that, after accounting for the number of predictors, the model's explanatory power decreases to 48.0%.

The ANOVA results indicate that the regression model as a whole is significant, with a p-value of 0.047, suggesting that the model provides a statistically significant explanation of the variance in NET IRR (%).

Among the predictor variables, FUND NUMBER (OVERALL) and FUND SIZE (USD MN) shows a positive and significant relationship with NET IRR (%), implying that as the overall fund number increases, there is a tendency for higher NET IRR (%). This suggests that larger funds may have a potential influence on increasing NET IRR (%) of private equity funds.

Additionally, the D/E RATIO demonstrates a positive and significant relationship with NET IRR (%). This implies that higher levels of leverage, as indicated by a higher D/E ratio, may be associated with higher NET IRR (%) of private equity funds.

On the other hand, the remaining predictors (FUND MANAGER TOTAL AUM (USD MN), GDP YOY GROWTH % (AVERAGED), INTEREST RATE YOY % (AVERAGED), STRATEGY, and CORE INDUSTRIES) do not show significant relationships with NET IRR (%) of private equity funds. These variables may not have a substantial impact on explaining the variation in NET IRR (%).

Multicollinearity occurs when two or more regressors are highly correlated to each other, such that they do not provide unique or independent information in the regression model. If the degree of correlation is high enough between the regressors used within the model, it can cause problems when interpreting the regression output. Therefore, we've tested for multicollinearity. When conducting a multicollinearity test, we want to look for the variance inflation factor (VIF), which measures the correlation and strength of correlation between the regressors within our regression model.

Considering the collinearity statistics, all predictors have acceptable values of tolerance and VIF, indicating no significant multicollinearity issues among the predictors. All the VIFs are between 1 and 5, meaning that there are correlations between the regressors used, as observed in the Pearson correlation matrix. However, these correlations are not severe enough to require our attention.

In conclusion, the regression analysis suggests that the overall fund number, fund size, and D/E ratio have potential influences on NET IRR (%) and thus have a significant positive influence on private equity performance. However, the other variables, FUND MANAGER TOTAL AUM (USD MN), GDP YOY GROWTH % (AVERAGED), INTEREST RATE YOY % (AVERAGED), STRATEGY, and CORE INDUSTRIES, do not demonstrate significant relationships with NET IRR (%), thus having no significant effect on private equity performance.

#### 4.3.3 Answering hypotheses

Based on the given information and regression analysis results, let's relate them to each hypothesis and provide clear answers:

##### *H 1.2.1.1 Industry sector:*

Private equity investments in certain industry sectors may not demonstrate a significant outperformance compared to their public equity counterparts in Western markets, as indicated by the regression analysis results. Thus, the hypothesis that industry sectors have a significant influence on the relative performance of private equity investments is not supported, thus H 1.2.1.1 Industry sector is rejected.

##### *H 1.2.1.2 Fund size and level of fund experience*

The regression analysis indicates that the overall fund number (a measure of fund experience) and fund size (FUND SIZE (USD MN) both show a positive and significant relationship with NET IRR (%), suggesting that funds with higher levels of experience and larger funds tend to have stronger relative performance. Although FUND MANAGER TOTAL AUM (USD MN) was shown as a non-significant predictor, there is enough evidence with regards to level of fund experience measured via overall fund number to support the hypothesis. Therefore, we can accept H 1.2.1.2 Fund size and level of fund experience.

##### *H 1.2.1.3 Investment strategies*

The regression analysis results do not provide evidence to support the hypothesis that private equity firms utilizing specific investment strategies such as VC (Venture Capital), GC (Growth Capital), and BO (Buyouts) experience superior performance compared to public equity investments. The predictor variable of strategy did not show a significant relationship with NET IRR (%) in the analysis, suggesting that investment strategies may not have a

significant influence on the relative performance of private equity investments in the given context. Therefore, we reject H 1.2.1.3 Investment strategies.

*H 1.2.1.4 Macroeconomic conditions*

The regression analysis results do not provide evidence to support the hypothesis that private equity investments demonstrate varying levels of performance relative to public equity investments based on macroeconomic conditions. The predictor variables of GDP YOY Growth % (averaged) and Interest Rate YOY % (averaged) did not show significant relationships with NET IRR (%) in the analysis, suggesting that these macroeconomic conditions may not have a significant influence on the relative performance of private equity investments in the given context. Thus, we reject H 1.2.1.4 Macroeconomic conditions.

*H 1.2.1.5 Leverage*

The regression analysis indicates that the D/E ratio (a measure of leverage) demonstrates a positive and significant relationship with NET IRR (%), suggesting that higher levels of leverage may be associated with higher NET IRR (%) of private equity funds. Therefore, we can accept H 1.2.1.5 Leverage.

In summary, based on regression analysis, we can accept H 1.2.1.2 (fund size and level of fund experience) and H 1.2.1.5 (leverage). The other hypotheses (H 1.2.1.1, H 1.2.1.3, and H 1.2.1.4) can be conclusively rejected since evidence stemming from the regression analysis has shown us that industry sector, investment strategies and macroeconomic conditions were of no significant influence on NET IRR (%), and thus private equity performance.

## 5. DISCUSSION

In this section, we will discuss the findings of our research and evaluate the hypotheses based on the results obtained from the regression analysis. Additionally, we will address the influence of significant predictors on NET IRR (%) in private equity funds, as well as the implications, limitations, and future research directions.

### 5.1 Overall findings

#### 5.1.1 Paired samples t-test

We must conclude that, based on the results in Table 3: The paired samples t-test, private equity has outperformed the S&P500 in Western markets over the time-horizon of 2000 up to and including 2020. Although non-significant, an outperformance of 1.38% was evident based on the NET IRR using the structured Preqin data set containing 79 private equity funds. This is in line with similar research conducted on private equity performance benchmarked against the S&P500, or similar index funds representing the market portfolio, such as those of Kaplan and Schoar (2003), Ljungqvist and Richardson (2003), and Harris et al. (2014).

In addition, this research used the NET IRR which means that the denoted returns in the data set are net of fees distributed to the private equity firms. This implies that, if this research would have considered the IRR instead of the NET IRR, the measured private equity performance will probably be significantly higher, which in turn would questionably have led to a significant mean difference with regards to the paired samples t-test. Moreover, due to the LN-PME shortness problem, the measured private equity performance is likely to be underestimated, giving the impression of mediocre performance for exceptional funds. Approximately 30% of private equity funds are impacted by this issue.

#### 5.1.1 Overall model fit

The regression analysis revealed valuable insights into the determinants of NET IRR (%) in private equity funds. The overall model exhibited a reasonably good fit, with an R-squared value of 0.699, indicating that approximately 69.9% of the variance in NET IRR (%) can be explained by the predictor variables. The adjusted R-squared value of 0.480 suggests that, after considering the number of predictors, the model's explanatory power decreased to 48.0%. Furthermore, the ANOVA results indicated that the regression model as a whole was statistically significant (p-value = 0.047), providing a significant explanation for the variance in NET IRR (%).

#### 5.1.3 Regression results

Among the predictors, Fund Number (Overall), Fund Size (USD MN), and D/E Ratio (Debt-to-Equity Ratio) have a positive and significant impact on NET IRR (%) in private equity funds. On the other hand, factors such as Fund Manager Total AUM (USD MN), GDP YoY Growth % (Averaged), Interest Rate YoY % (Averaged), Strategy, and Core Industries do not show significant relationships with NET IRR (%).

### 5.2 Hypotheses evaluation

We will now briefly mention which hypotheses are accepted or rejected following the regression results. For a more thorough and robust explanation regarding our research hypotheses, please refer to 4.3.3 Answering hypotheses.

Based on the regression analysis results, the hypothesis that fund size and level of fund experience have a significant impact on private equity fund performance is supported. Additionally, higher levels of leverage demonstrate a positive and significant relationship with private equity fund performance. However, the hypotheses suggesting a significant influence

of industry sector, investment strategies, and macroeconomic conditions on private equity fund performance are rejected.

### **5.3 Influence of NET IRR predictors**

#### ***5.3.1 Significant predictors***

The regression analysis revealed several predictors that demonstrated significant relationships with NET IRR (%) in private equity funds. Specifically, the overall fund number, fund size, and D/E ratio emerged as significant predictors.

The overall fund number, representing the level of fund experience, exhibited a positive and significant relationship with NET IRR (%). This suggests that funds with greater experience tend to achieve higher NET IRR (%), indicating the importance of accumulated knowledge and expertise in private equity performance.

Similarly, fund size, measured by FUND SIZE (USD MN), demonstrated a positive and significant impact on NET IRR (%). Larger funds were associated with higher NET IRR (%), indicating the potential benefits of economies of scale, access to diverse investment opportunities, and enhanced resource allocation.

The findings from our regression analysis align with the existing literature. Kaplan and Schoar (2005) found a significantly positive relationship between fund size and fund performance, which supports our observation of a positive impact of fund size on NET IRR (%) in private equity investments. However, it should be noted that Aigner et al. (2008) documented a negative impact of fund size on private equity fund performance, which contradicts our findings. This suggests that the relationship between fund size and performance is a debated topic in the literature, as mentioned earlier in this research.

Furthermore, the D/E ratio, representing the level of leverage, exhibited a positive and significant relationship with NET IRR (%). This implies that higher leverage levels are linked to higher NET IRR (%), suggesting that the use of leverage may contribute to enhanced private equity performance. Our findings support the notion that higher levels of leverage, as indicated by the D/E ratio, have a positive impact on NET IRR (%) in private equity funds. This aligns with the argument that leverage can amplify returns by allowing investors to control larger assets with less equity investment, potentially leading to higher valuations and returns (Kaplan and Stein, 1993).

Overall, these significant predictors—overall fund number, fund size, and D/E ratio—highlight their positive impact on private equity performance. They suggest that fund experience, fund size, and leverage play crucial roles in achieving higher NET IRR (%) in private equity investments, emphasizing the importance of strategic decision-making, with regards to their operations as well as their capital structure, by fund managers in the private equity industry.

#### ***5.3.1 Non-significant predictors***

For the non-significant predictors in our model, namely fund manager total AUM, GDP YOY growth %, interest rate YOY %, strategy, and core industries, the literature provides mixed findings regarding their impact on private equity performance.

Regarding industry sector, previous studies have highlighted its influence on private equity and public equity investments. Phalippou and Gottschalg (2009) found that private equity investments in certain industry sectors, such as industrial and healthcare, outperformed others like financial and consumer sectors. Acharya et al. (2012) found that, on average, about 12% of the average deal IRR of private equity investments is due to exposure to the quoted sector itself. The Global Private Equity Report from Bain & Company also emphasizes the advantages of specialization and expertise in specific industry sectors with regards to private

equity investments . Following the results of our analysis, we did not find a significant relationship between industry sector and NET IRR (%), thus contradicting existing literature on the influence of certain types of industry sectors with regards to private equity investments.

Regarding fund manager total AUM, our analysis did not find a significant relationship between this predictor and NET IRR (%). The fund manager total AUM was a measure of level of fund experience within this research but was not backed specifically by any literature. In addition, it cannot be linked to any specific literature on fund size since most fund manager total AUM were listed as a horizontal fund value (the cumulative value of multiple funds managed by (a) fund manager(s)), and not vertical (the value of a single fund managed by (a) fund managers(s)). In other words, most fund managers were managing multiple funds simultaneously instead of managing one specific private equity fund. Thus, the metric is unusable while considering literature on total fund size. The literature that can be contradicted via our findings with regards to level of fund experience (measured through fund manager total AUM) is that of Aigner et al. (2008) and Kaplan and Schoar (2005) which both claim that higher levels of GP experience lead to superior private equity performance.

While our analysis did not support a significant relationship between fund manager total AUM and NET IRR (%), the conflicting findings in the literature indicate that the impact of fund size on private equity performance is still a debated topic. Further research is necessary to gain a deeper understanding of how fund manager total AUM influences the performance of private equity investments.

In terms of GDP YOY growth %, and interest rate YOY %, our analysis did not establish significant relationships with NET IRR (%). However, previous research such as Aigner et al. (2008) found that private equity fund performance is negatively correlated with rising interest rates, while Kaplan and Schoar (2005) observed that private equity outperforms public equity indices during periods of low interest rates. These findings indicate that macroeconomic conditions, including interest rates and GDP growth, can influence private equity performance, although our specific analysis did not find significant effects and thus contradicts these findings.

Regarding investment strategies, our analysis did not find a significant relationship between strategy and NET IRR (%). However, previous studies have shown that buyout strategies tend to outperform venture capital strategies (Phalippou and Gottschalg, 2008; Ljungqvist and Richardson, 2003). The number of deals made also positively relates to private equity returns (Aigner et al., 2008). While our analysis did not confirm these relationships and thus contradicts these findings, the literature suggests that investment strategies can be important determinants of private equity performance. Therefore, a more thorough analysis on whether investment strategies influence private equity performance is very much suited as the solution to this discrepancy.

Overall, while our analysis did find non-significant relationships between some predictors and NET IRR (%), it is important to note that the literature presents diverse findings and highlights the potential influence of these factors on private equity performance. Different datasets and methodologies used in various studies may contribute to the divergent results. Therefore, further research is needed to gain a comprehensive understanding of the impact of fund manager total AUM, GDP YOY growth %, interest rate YOY %, strategy, and core industries on private equity performance.

#### **5.4 Limitations**

Our study has several limitations that should be acknowledged. Firstly, the dataset used in our analysis may have limitations in terms of its coverage and representativeness. The dataset might not encompass the entire population of private equity funds, potentially leading to

sample selection bias and affecting the generalizability of our findings. Additionally, the quality and availability of data variables may vary, introducing potential measurement errors and limiting the accuracy of our analysis.

Secondly, the time horizon of our study is an important limitation. We focused on a specific time period, and private equity performance can vary over different market cycles. The findings may not capture the full range of performance outcomes that could arise in different economic conditions or market environments. Moreover, the study had a specific geographical focus, which may restrict the generalizability of our findings to other regions or countries. Private equity dynamics, regulations, and market characteristics can vary across different geographic contexts, and our results should be interpreted within the context of the specific region under investigation.

Furthermore, although it takes into account the magnitude and timing of cash flows, NET IRR calculations rely on the accuracy and availability of data related to cash flows, which can be challenging to obtain and may be subject to reporting errors. Incomplete or inaccurate data can introduce bias and affect the reliability and validity of the NET IRR estimates. Additionally, the use of different valuation methodologies and assumptions across funds can introduce inconsistencies and make comparisons between funds difficult.

Another important consideration is that NET IRR is a backward-looking measure that reflects historical performance. It may not fully capture the future potential and risk associated with private equity investments. The dynamics of the market can change over time, and factors such as economic conditions, industry trends, and regulatory changes can significantly impact future fund performance. Therefore, relying solely on NET IRR may not provide a complete picture of the investment landscape and the potential risks and rewards that lie ahead.

Moreover, the interpretation and comparability of NET IRR can be challenging due to variations in fund structures, investment strategies, and risk profiles. Different funds may have different investment horizons, target industries, and geographical focuses, making direct comparisons challenging. Therefore, while NET IRR serves as a valuable performance measure, it should be interpreted with caution and in conjunction with other relevant metrics and qualitative factors.

Lastly, The LN-PME approach, commonly used to compare private equity fund performance to a public market index, has a limitation known as the shortness problem. This issue arises when a private equity fund makes large distributions or holds short positions for extended periods within the LN-PME calculation. As a result, the remaining value of the index investment can become negative, disrupting the calculation process.

The shortness problem can lead to a significant underestimation of true outperformance, making exceptional funds appear mediocre when evaluated using LN-PME. Research suggests that around 30% of private equity funds are affected to some degree, with approximately 5% of cases where the LN-PME calculation is incomputable.<sup>7</sup> In conclusion, the shortness problem is a limitation of the LN-PME approach, potentially distorting the evaluation of private equity fund performance and causing the performance of affected private equity funds look more poor than they actually are.

## **5.5 Implications and recommendations**

### **5.5.1 Theoretical implications**

The findings of this study have significant theoretical implications for understanding the factors that influence the performance of private equity funds. The identified predictors, including fund size, overall fund number, and leverage, provide valuable insights into the dynamics of the private equity industry. These predictors help gaining knowledge on the

underlying mechanisms that drive private equity performance and contribute to the existing body of knowledge in the field.

Moreover, the theoretical implications of the study highlight the importance of fund size as a determinant of private equity performance. Understanding the relationship between fund size and net IRR can inform theoretical models and frameworks that aim to explain the behavior of private equity investments. Similarly, the impact of overall fund number on performance provides insights into the relationship between general partners' level of experience and their effect on returns. The consideration of leverage in the private equity context adds to the theoretical understanding of risk-return trade-offs and the role of financial leverage in amplifying investment outcomes.

### 5.5.2 Practical implications

The practical implications of the study are relevant for investors, private equity firms, and policymakers. For investors, the identified predictors offer practical guidance in making informed investment decisions. The findings emphasize the significance of considering fund size, overall fund number, and leverage when evaluating potential private equity investment opportunities. Investors can utilize this information to assess the risk and return profile of different funds and align their investment strategies accordingly.

Private equity firms can leverage the practical implications of the study to enhance their performance and attract investors. Understanding the influence of fund size, overall fund number, and leverage can aid private equity firms in optimizing their operations and investment strategies. By carefully managing these factors, firms can position themselves for higher returns and improved competitiveness in the private equity market.

Policymakers can also benefit from the practical implications of the study by incorporating them into the formulation of regulations and policies. The findings underscore the importance of considering fund size, overall fund number, and leverage when designing frameworks that govern the private equity industry. Policymakers can aim to strike a balance between promoting investor protection and stimulating a more potent investment environment for private equity investments. By aligning policies with the identified predictors, policymakers can contribute to the sustainable growth and stability of the private equity sector.

### 5.5.1 Recommendations

In conclusion, the research provided valuable insights into what factors could possibly drive, and amplify, private equity fund performance. It is therefore of high importance that these factors should be further analyzed and researched via various measures to ensure the validity of this research, and more important to strengthen the knowledgebase on what drives private equity performance. These insights can inform theoretical models and frameworks, deepening our understanding of risk-return dynamics in private equity investments.

From a practical standpoint, these findings provide actionable recommendations for investors, private equity firms, and policymakers. Investors should consider fund size, overall fund number, and leverage when evaluating investment opportunities, allowing them to make informed decisions aligned with their risk preferences. Private equity firms can optimize their operations and investment strategies by carefully managing these factors, potentially improving their performance and attracting investors. Policymakers can incorporate these findings into regulations and policies to foster a conducive environment for private equity investments while safeguarding investor interests.



## **5.6 Future research**

There are several potential areas for future research that can expand upon the findings of this study and deepen our understanding of the determinants of NET IRR (%) in private equity funds.

One avenue for future research is to explore different predictors that may impact private equity performance. Variables such as fund vintage year, investment horizon, management fees, carried interest structure, and governance mechanisms could be examined to assess their influence on private equity returns. By expanding the set of predictors, a more broad understanding of the drivers of private equity performance can be achieved. Another direction for future research is to investigate non-linear relationships between predictors and private equity returns. This study focused on linear relationships, but exploring potential thresholds or certain saturation points could provide insights into critical levels of fund size, overall fund number, or leverage that significantly affect performance.

Conducting analyses that span multiple time periods and market cycles can also contribute to our understanding of private equity performance. By examining how the relationship between predictors and private equity returns changes over time, researchers can gain insights into the dynamic factors that influence private equity returns. In addition, a comparative analysis across more continents or countries than this specific research is another avenue for future research. By exploring how demographic factors interact with the identified predictors, researchers can provide insights into the variations in private equity performance across different markets and different cultures.

Addressing these future research directions will advance our knowledge of private equity performance and provide all involved parties with a more precise guidance for decision-making in the private equity industry.

## 6. CONCLUSION

In conclusion, this study aimed to investigate the determinants of return performance in private equity funds. Through a comprehensive analysis of a diverse dataset, several key findings have emerged, providing valuable insights on the factors that significantly influence private equity fund performance.

The results indicate that fund size, overall fund number, and leverage play crucial roles in determining the NET IRR of private equity funds. Fund size demonstrated a positive relationship with NET IRR, suggesting that larger funds have the potential to generate higher returns. Furthermore, the overall fund number exhibited a positive relationship with NET IRR, implying that a higher number of funds managed by a general partner could increase performance. The inclusion of leverage as a predictor highlighted the risk-return trade-off, emphasizing the impact of financial leverage on private equity returns.

These findings have both theoretical and practical implications. Theoretical implications extend our understanding of the underlying mechanisms that drive private equity performance, contributing to the existing body of knowledge in the field. The practical implications are relevant for investors, private equity firms, and policymakers. Investors can utilize these findings to make informed investment decisions by considering fund size, overall fund number, and leverage as important factors in their evaluation process. Private equity firms can optimize their operations and strategies based on these insights to enhance their performance and attract investors. Policymakers can design regulations and policies that align with these determinants, aiming to foster a more robust and investor-friendly private equity environment.

However, it is important to acknowledge the limitations of this study. The sample size and specific characteristics of the dataset used may restrict the generalizability of the findings. Additionally, the study focused on a particular time period and geographical region, limiting the scope of the analysis. Future research should aim to address these limitations by expanding the sample size, considering different time horizons and regions, and exploring additional variables or methodologies to gain a deeper understanding of the determinants of NET IRR (%) in private equity funds.

In conclusion, this study provides valuable insights into the factors influencing private equity fund performance. The identified predictors, fund size, overall fund number, and leverage, offer practical implications for investment decision-making and industry practices. By considering these determinants, investors can navigate the private equity landscape more effectively, private equity firms can optimize their strategies, and policymakers can shape a conducive environment for private equity investments. Continued research in this field will contribute to a more comprehensive understanding of private equity performance and foster the growth and success of the industry.

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